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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPERS

Nos. 241-244

WASHINGTON
GOVERNMENT PRINTING OFFICE
1910

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Same 243; Surface water supply of United States, 1907–08, pt. 3, Ohio River basin.

Same 244; Surface water supply of United States, 1907–08, pt. 4, St. Lawrence River basin.

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 241

SURFACE WATER SUPPLY OF THE UNITED STATES

1907–8

PART I. NORTH ATLANTIC COAST

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

H. K. BARROWS AND R. H. BOLSTER

WASHINGTON
GOVERNMENT PRINTING OFFICE
1910

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SURFACE WATER SUPPLY OF THE NORTH ATLANTIC COAST, 1907-8.

By H. K. Barrows and R. H. Bolster.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of flow measurements made on certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with organizations mentioned herein. These investigations are authorized by the organic law of the Geological Survey (Stat. L., vol. 20, p. 394), which provides, among other things, as follows:

> Provided that this officer [the director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

Inasmuch as water is the most abundant and most valuable mineral in nature, the investigation of water resources is included under the above provision for investigating mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—	
1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the river systems or parts thereof that might purposefully be studied. The scope of the work is limited to that which can be provided with the appropriations available. The field covered and the character of the work are believed to be the best that could be accomplished under the controlling conditions. It would undoubtedly be of more scientific importance and ultimately of more practical value if the money now applied to wide areas were concentrated on a few small basins. Such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be maintained during a period of years sufficient to cover all stages, in order that within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum may be determined. The length of such a period manifestly varies for different streams and can not be absolutely determined. Experience has shown that the records should cover from five to ten years, or for some streams twenty years or more, the limit being determined by the relative importance of the stream and the interdependence of the results and other long-time records on adjacent streams.

In the performance of this work the Geological Survey endeavors to approach as nearly as possible the highest degree of precision which a rational expenditure of time and a judicious expenditure of a small amount of money will allow. In all engineering work there is a point of refinement beyond which it is needless and wasteful to proceed, and this principle applies with especial force to stream-flow measurements. It is confidently believed that with some unavoidable exceptions the stream-flow data presented in the publications of the Survey are sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of many stations. All persons are cautioned to exercise the greatest care in the utilization of such incomplete records.

Records of varying lengths have been obtained at about 1,400 different points in the United States, and in addition the surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, has been investigated. During 1907 and 1908 regular gaging stations were maintained by the Survey and cooperating organizations at about 740 points in the United States, and in addition numerous miscellaneous measurements were made. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country.

These data will be made available in the regular surface water-supply papers and in special papers from time to time.

PURPOSES OF THE WORK.

Among the purposes for which the results contained in this volume are requisite are navigation, irrigation, domestic water supply, water power, swamp and overflow land drainage, and flood prevention. The demands of all these interests are immediate.

Navigation.—The Federal Government has expended more than $250,000,000 for the improvement of inland navigation, and prospective expenditures will approximate several times this amount. It is obvious that the determination of stream flow is necessary to the intelligent solution of the many problems involved.

Irrigation.—The United States is now expending $42,000,000 on federal irrigation systems, and this amount is far exceeded by the private expenditures of this nature in the arid West. The integrity of any irrigation system is based absolutely on the amount of water available. Therefore investigations of stream flow in that portion of the country are of first importance in the redemption of the lands, as well as constituting an insurance of federal and private investments.

Domestic water supply.—The highest use of water is that of domestic supply, and while the federal interest in this aspect of the matter is less direct than in the aspects already named this use of water nevertheless has so broad a significance with respect to the general welfare that the Federal Government is ultimately and intimately concerned.

Water power.—The time is rapidly approaching when the development of the water power of the country will be an economic necessity. Our stock of coal is being rapidly depleted and the cost of steam power is increasing accordingly. Industry will cease its growth if cheap power is not available, and in that event the United States as a nation will cease to progress. Water power is the only avenue now open. When the electric transmission of power was accomplished, the relation of our water powers to national economy changed entirely. Previous to the day of electric transmission the importance of a water power was largely confined to the locality at which it was generated, but it has now become a public utility in which the individual citizen is vitally interested. Inasmuch as the amount of water power that may be made available is dependent on the flow of rivers, the investigation of flow becomes a prerequisite in the judicious management of this source of energy.

Drainage of swamp and overflowed lands.—More than 70,000,000 acres of the richest land in this country are now practically worthless, or of precarious value, by reason of overflow and swamp condi-

tions. When this land is drained it becomes exceedingly productive and its value increases many fold. Such reclamation would add to the national assets at least $700,000,000. The study of run-off is the first consideration in connection with drainage projects. If by the drainage of a large area into any particular channel that channel becomes so gorged with water which it had not hitherto been called upon to convey that overflow conditions are created in places where previously the land was not subject to inundation, then drainage results merely in an exchange of land values. This is not the purpose of drainage improvement.

Flood prevention. The damage from floods in the United States exceeds $100,000,000 annually and in the year 1908 the aggregate damage, based on reliable data, approximated $250,000,000. Such an annual tax on the property of great regions should be reduced in the orderly progress of government. It goes without saying that any consideration of flood prevention must be based on a thorough knowledge of stream flow, both in the contributing areas which furnish the water and along the great lowland rivers.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey since its inception have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications has varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1907 and 1908. The dividing line between the North Atlantic and South Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1907–8.

Part.	No.	Title.	Part.	No.	Title.
I	241	North Atlantic coast.	VI	246	Missouri River Basin.
II	242	South Atlantic coast and eastern Gulf of Mexico.	VII	247	Lower Mississippi River Basin.
III	243	Ohio River Basin.	VIII	248	Western Gulf of Mexico.
IV	244	St. Lawrence River Basin.	IX	249	Colorado River Basin.
V	245	Upper Mississippi River and Hudson Bay basins.	X	250	Great Basin.
			XI	251	California.
			XII	252	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey exclusive of all special papers. Numbers of reports are inclusive, and dates also are inclusive so far as the data are available.

Stream-flow data in reports of the United States Geological Survey.

[Ann.=Annual Report; B.=Bulletin; W. S.=Water-Supply Paper.]

Report.	Character of data.	Year.
10th Ann., pt. 2	Descriptive information only	
11th Ann., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th Ann., pt. 2	do	1884 to June 30, 1891.
13th Ann., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th Ann., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1892 and 1894.
16th Ann., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W. S. 11	Gage heights (also gage heights for earlier years)	1896.
18th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W. S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W. S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W. S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W. S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1896.
20th Ann., pt. 4	Monthly discharge (also for many earlier years)	1898.
W. S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st Ann., pt. 4	Monthly discharge	1899.
W. S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d Ann., pt. 4	Monthly discharge	1900.
W. S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W. S. 75	Monthly discharge	1901.
W. S. 82 to 85	Complete data	1902.
W. S. 97 to 100	do	1903.
W. S. 124 to 135	do	1904.
W. S. 165 to 178	do	1905.
W. S. 201 to 214	Complete data, except descriptions	1906.
W. S. 241 to 252	Complete data	1907–8.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119. The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1908. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas Rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1908.

	1899.[a]	1900.[b]	1901.	1902.	1903.	1904.	1905.	1906.	1907–8.
Atlantic coast and eastern Gulf of Mexico:									
New England rivers	35	47	65, 75	82	97	124	165	201	241
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	82	97	125	166	202	241
Susquehanna River to York River, inclusive	35	48	65, 75	82	97	126	167	203	241
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98	126	167	203	242
Santee River to Pearl River, inclusive	36	48	65, 75	83	98	127	168	204	242
St. Lawrence River	36	49	65, 75	(82), 83	97	129	170	206	244
Hudson Bay	.....	.....	66, 75	85	100	130	171	207	245
Mississippi River:									
Ohio River	36	48, (49)	65, 75	83	98	128	169	205	243
Upper Mississippi River	36	49	65, 75	83	98, (99)	128, (130)	171	207	245
Missouri River	(36), 37	49, (50)	66, 75	84	99	130, (131)	172	208	246
Lower Mississippi River	37	50	(65), 66, 75	(83), 84	(98), 99	(128), 131	(169), 173	(205), 209	247
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248
Pacific coast and Great Basin:									
Colorado River	(37), 38	50	66, 75	85	100	133, (134)	175, (177)	211, (213)	249, (251)
Great Basin	38, (39)	51	66, 75	85	100	133, (134)	176, (177)	212, (213)	250, (251)
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100	134	177	213	251
North Pacific coast	38	51	66, 75	85	100	135	(177), 178	214	252

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	All stations in Colorado and Great Basin drainages lying in California repeated.
	Great Basin	

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined on the basis of drainage area, local changes in name and lake surface being disregarded. After all stations from the source to the mouth of the main stem of the river have been given, the tributaries are taken up in regular order from source to mouth. The tributaries are treated the same as the main stream, all stations in each tributary basin being given before taking up the next one below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is often clearer to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Gallons per minute" is generally used in connection with pumping and city water supply.

The "miner's inch" is the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It is commonly used by miners and irrigators throughout the West and is defined by statute in each State in which it is used.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of March 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equal 18.7 United States gallons per second.
100 California miner's inches equal 96.0 Colorado miner's inches.
100 California miner's inches for one day equal 4.96 acre-feet.
100 Colorado miner's inches equal 2.60 second-feet.
100 Colorado miner's inches equal 19.5 United States gallons per second.
100 Colorado miner's inches equal 104 California miner's inches.
100 Colorado miner's inches for one day equal 5.17 acre-feet.
100 United States gallons per minute equal 0.223 second-foot.
100 United States gallons per minute for one day equal 0.442 acre-foot.
1,000,000 United States gallons per day equal 1.55 second-feet.
1,000,000 United States gallons equal 3.07 acre-feet.
1,000,000 cubic feet equal 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic foot.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.

1 horsepower equals 1 second-foot falling 8.80 feet.

$1\frac{1}{3}$ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF TABLES.

For each drainage basin there is given a brief description of general conditions covering such features as area, source, tributaries, topography, geology, conditions of forestation, rainfall, ice conditions, irrigation, storage, power possibilities, and other special features of importance or interest.

For each regular current-meter gaging station are given in general, and so far as available, the following data: Description of station, list of discharge measurements, table of daily gage heights, rating table, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height and rating tables are omitted and a table of daily discharges is substituted. For stations where the flow is computed by shifting-channel methods, a table of daily discharges is given in place of rating tables, which are not used in these methods of computation.

In addition to statements regarding the location and installation of current-meter stations, the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting conditions of flow, and backwater; also full information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights gives the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights during ice conditions, backwater from obstructions, etc., are published as recorded, with suitable footnotes. The rating is not applicable for such periods unless the proper correction to the gage heights is known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which the rating tables and monthly-discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is published to enable engineers to determine the daily discharge by its application to the table of gage heights or to check results in the table of monthly discharge.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the period when the water surface was at crest height and the corresponding discharge consequently larger than given in this column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 13, are based.

FIELD METHODS OF MEASURING STREAM FLOW.

There are three distinct methods of determining the flow of open-channel streams: (1) By measurements of slope and cross section and the use of Chezy's and Kutter's formulas; (2) by means of a weir or dam; (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen depends on the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

Slope method.—Much information has been collected relative to the coefficients to be used in the Chezy formula, $v = c\sqrt{Rs}$. This has been utilized by Kutter, both in developing his formula for c and in determining the values of the coefficient n which appears therein. The results obtained by the slope method are in general only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value for n to be used in Kutter's formula. The most common use of this method is in estimating the flood discharge of a stream when the only data available are the cross section, the slope as shown by marks along the bank, and a knowledge of the general conditions. It is seldom used by the United States Geological Survey. For full information regarding this method the reader is referred to the various text-books on hydraulics.

Weir method.—Relatively few stations are maintained at weirs or dams by the United States Geological Survey. Standard types of

sharp-crested and broad-crested weirs within the limits for which accurate cofficients have been experimentally obtained give very accurate records of discharge if properly maintained. At practically all broad-crested weirs, however, there is a diversion of water either through or around the dam, usually for the purpose of development of water power. The flow is often complicated and the records are subject to errors from such sources as leakage through the dam, backwater at high stages, uncertainty regarding coefficient, crest which is not level, obstructions from logs or ice, use of flashboards, old turbines with imperfect ratings, and many others depending on the type of development and the uses of the diverted water.

In general, records of discharge at dams are usually accurate enough for practical use if no others are available. It has been the general experience of the United States Geological Survey, however, that records at current-meter gaging stations under unobstructed-channel conditions are more accurate than those collected at dams, and where the conditions are reasonably favorable are practically as good as those obtained at sharp-crested weirs.

The determination of discharge over the different types of weirs and dams is treated fully in "Weir experiments, coefficients, and formulas" (Water-Supply Paper 200[a]) and in the various text-books on hydraulics. "Turbine water-wheel tests and power tables" (Water-Supply Paper 180) treats of the discharge through turbines when used as meters. The editions of both of these water-supply papers are practically exhausted. They can, however, be consulted at most of the larger libraries of the country or they can be obtained from the Superintendent of Documents, Washington, D. C., at a cost of 20 cents for No. 180 and 35 cents for No. 200. Remittances must be made by postal money order, express order, or New York draft.

Velocity method.—Streams in general present throughout their courses to a greater or less extent all conditions of permanent, semi-permanent, and varying conditions of flow. In accordance with the location of the measuring section with respect to these physical conditions, current-meter gaging stations may in general be divided into four classes—(1) those with permanent conditions of flow; (2) those with beds which change only during extreme high water; (3) those with beds which change frequently but which do not cause a variation of more than about 5 per cent of the discharge curves from year to year; and (4) those with constantly shifting beds. In determining the daily flow different office methods are necessary for each class. The field data on which the determinations are based and the methods of collecting them are, however, in general the same.

[a] Water-Supply Paper 200 is a revision of No. 150, the edition of which is exhausted.

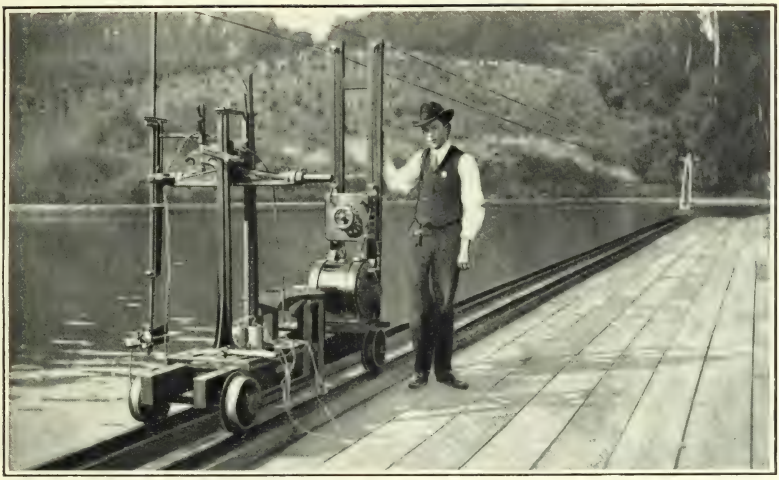
Great care is taken in the selection and equipment of gaging stations for determining discharge by velocity measurements, in order that the data may have the required degree of accuracy. They are located, as far as possible, at such points that the relation between gage height and discharge will always remain constant for any given stage. The experience of engineers of the Geological Survey has been that permanency of conditions of flow is the prime requisite of any current-meter gaging station when maintained for several years unless funds are available to cover all changes in conditions of flow. A straight, smooth section, without cross currents, backwater, boils, etc., at any stage is highly desirable, but on most streams is not attainable except at the expense of a cable equipment. Rough, permanent sections, if measurements are properly made by experienced engineers, taking measuring points at a distance apart of 2 to 5 per cent or less of the total width, will within reasonable limits yield better results for a given outlay of money than semipermanent or shifting sections with smooth, uniform current. So far as possible, stations are located where the banks are high and not subject to overflow at high stages and out of the influence of tributary streams, dams, or other artificial obstructions which might affect the relation between gage height and discharge.

A gaging station consists essentially of a gage for determining the daily fluctuations of stage of the river and some structure or apparatus from which discharge measurements are made, usually a bridge or cable.

The two factors required to determine the discharge of a stream past a section perpendicular to the mean direction of the current are the area of the cross section and the mean velocity of flow normal to that section.

In making a measurement with a current meter, a number of points, called measuring points, are measured off above and in the plane of the measuring section at which observations of depth and velocity are taken. (See Pl. I, *B*.) These points are spaced equally for those parts of the section where the flow is uniform and smooth, and are spaced unequally for other parts, according to the discretion and judgment of the engineer. In general, the points should not be spaced farther apart than 5 per cent of the distance between piers, nor farther apart than the approximate mean depth of the section at the time of measurement.

The measuring points divide the total cross section into elementary strips, at each end of which observations of depth and velocity are made. The discharge of any elementary strip is the product of the average of the depths at the two ends times the width of the strip times the average of the mean velocities at the two ends of the



A. CURRENT-METER RATING STATION AT LOS ANGELES, CAL.

B. BRIDGE STATION AND CROSS SECTION OF STREAM.

Illustrating 0.2 and 0.8 depth method.

strip. The sum of the discharges of the elementary strips is the total discharge of the stream. (For a discussion of methods of computing the discharge of a stream see Engineering News, June 25, 1908.)

Depths for the determination of the area are usually obtained by sounding with the current meter and cable. In rough sections or swift current an ordinary weight and cable are used, particular care being taken that all observations shall be in the plane of the cross section.

Two methods of determining the velocity of flow of a stream are in general use—the float method and the current-meter method.

The float method, with its various modifications of surface, subsurface, and tube or rod floats, is now considered obsolete in the ordinary practice of the United States Geological Survey. The use of this method is limited to special conditions where it is impracticable to use the current meter, such as in places where large quantities of ice or débris which may damage the meter are flowing with the current, and for miscellaneous measurements or other work where a high degree of accuracy is not necessary. Tube floats are very satisfactory for use in canals with regular bottoms and even flow of current. Measurements by the float method are made as follows: The velocity of flow of the stream is obtained by observing the time which it takes floats set free at different points across the stream to pass between two range lines about 200 feet apart. The area used is the mean value obtained from several cross sections measured between the two range lines. The chief disadvantages of this method are difficulty in obtaining the correct value of mean area for the course used and uncertainty regarding the proper coefficient to apply to the observed velocity. (For further information regarding this method the reader is referred to Water-Supply Paper 95 and to the various text-books covering the general subject of stream flow.)

The Price current meter is now used almost to the exclusion of other types of meters by the United States Geological Survey in the determination of the velocity of flow of water in open channels, a use for which it is adapted under practically all conditions. Plate II shows in the center the new type of penta-recording current meter equipped for measurements at bridge and cable stations. On the sides the same type of meter is shown equipped for wading measurements, to record by the acoustic method on the left and by the electric method on the right. Briefly, the meter consists of six cups attached to a vertical shaft which revolves on a conical hardened-steel point when immersed in moving water. The number of revolutions is indicated electrically. The rating or relation between the velocity of the moving water and the revolutions of the wheel is determined for each meter by drawing it through still water for a given distance at different speeds and noting the number of revolutions for each run,

(See Pl. I, *A*.) From these data a rating table is prepared which gives the velocity per second of moving water for any number of revolutions in a given time interval. The ratio of revolutions per second to velocity of flow in feet per second is very nearly a constant for all speeds, and is approximately 0.45.

Three classes of methods of measuring velocity with current meters are in general use—multiple-point, single-point, and integration.

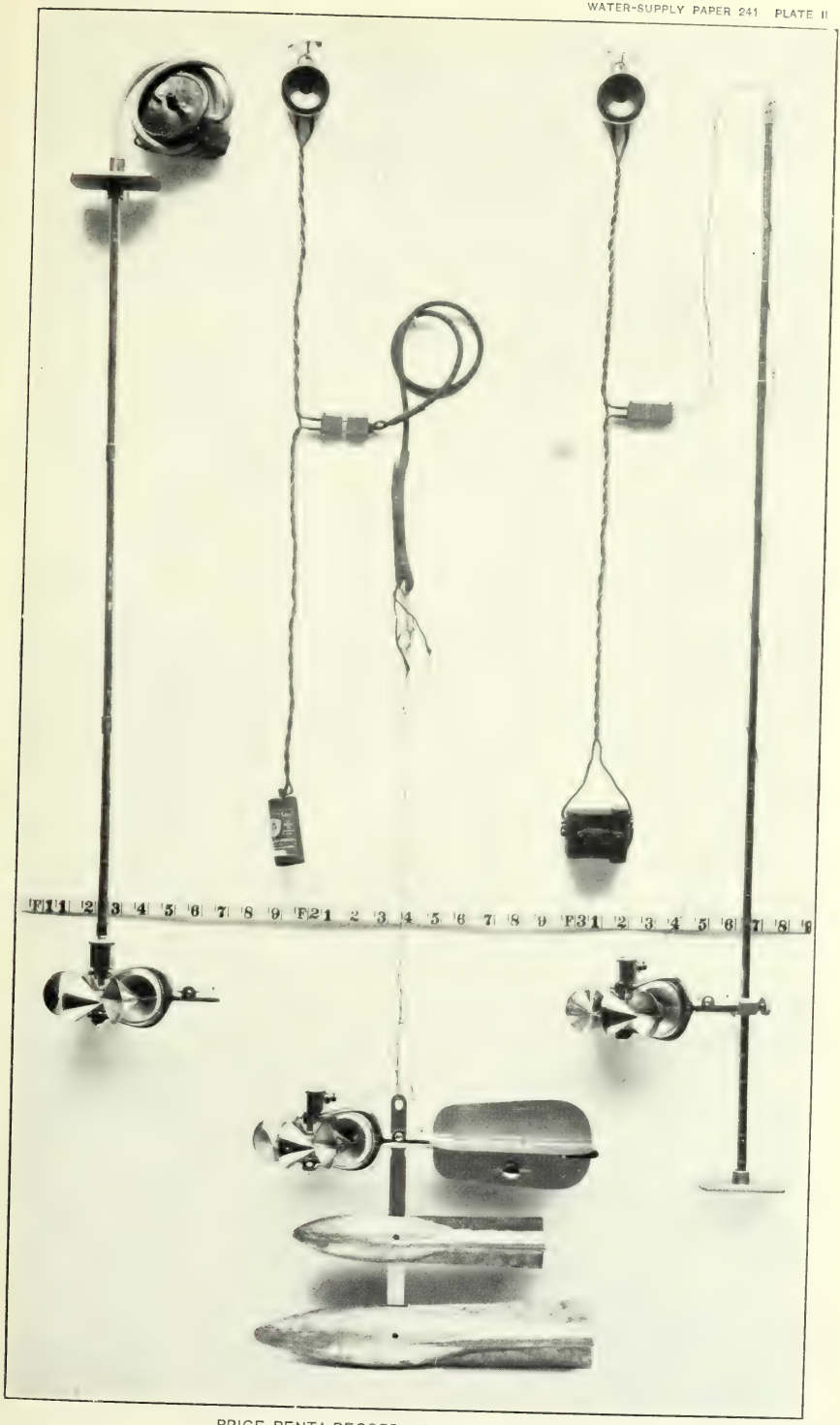
The two principal multiple-point methods in general use are the vertical velocity curve and 0.2 and 0.8 depth.

In the vertical velocity curve method a series of velocity determinations are made in each vertical at regular intervals, usually about 10 to 20 per cent of the depth apart. By plotting these velocities as abscissas and their depths as ordinates and drawing a smooth curve among the resulting points, the vertical velocity curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the area bounded by this velocity curve and its axis by the depth. This method of obtaining the mean velocity in the vertical is probably the best known, but on account of the length of time required to make a complete measurement its use is largely limited to the determination of coefficients for purposes of comparison and to measurements under ice.

In the second multiple-point method the meter is held successively at 0.2 and 0.8 depth, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. (See Pl. I, *B*.) On the assumption that the vertical velocity curve is a common parabola with horizontal axis, the mean of the velocities at 0.22 and 0.79 depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this multiple-point method gives the mean velocity very closely for open-water conditions and that in a completed measurement it seldom varies as much as 1 per cent from the value given by the vertical velocity curve method. Moreover, the indications are that it holds nearly as well for ice-covered rivers. It is very extensively used in the regular practice of the United States Geological Survey.

The single-point method consists in holding the meter either at the depth of the thread of mean velocity or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined or must be assumed.

Extensive experiments by means of vertical velocity curves show that the thread of mean velocity generally occurs between 0.5 and 0.7 total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and at this point the meter is held in most of the measurements made by the single-point method. A large number of vertical velocity curve measurements, taken on



PRICE PENTA-RECORDING CURRENT METERS.

many streams and under varying conditions, show that the average coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity. The variation of the coefficient from unity in individual cases is, however, greater than in the 0.2 and 0.8 method and the general results are not as satisfactory.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocity taken at the subsurface to the mean has been found to be in general from about 0.85 to 0.95, depending on the stage, velocity, and channel conditions. The higher the stage the larger the coefficient. This method is especially adapted for flood measurements, or when the velocity is so great that the meter can not be kept in the correct position for the other methods.

The vertical-integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface, and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is useful as a check on the point methods. In using the Price meter great care should be taken that the vertical movement of the meter is not rapid enough to vitiate the accuracy of the resulting velocity.

The determination of the flow of an ice-covered stream is difficult, owing to diversity and instability of conditions during the winter period and also to lack of definite information in regard to the laws of flow of water under ice. The method now employed is to make frequent discharge measurements during the frozen periods by the 0.2 and 0.8 and the vertical velocity curve methods, and to keep an accurate record of the conditions, such as the gage height to the surface of the water as it rises in a hole cut in the ice, and the thickness and character of the ice. From these data an approximate estimate of the daily flow can be made by constructing a rating curve (really a series of curves) similar to that used for open channels, but considering, in addition to gage heights and discharge, the varying thickness of ice. For information in regard to flow under ice cover, see Water-Supply Paper 187.

OFFICE METHODS OF COMPUTING AND STUDYING DISCHARGE AND RUN-OFF.

At the end of each year the field or base data for current-meter gaging stations, consisting of daily gage heights, discharge measurements, and full notes, are assembled. The measurements are plotted on cross-section paper and rating curves are drawn wherever feasible. The rating tables prepared from these curves are then applied to

the tables of daily gage heights to obtain the daily discharges, and from these applications the tables of monthly discharge and run-off are computed.

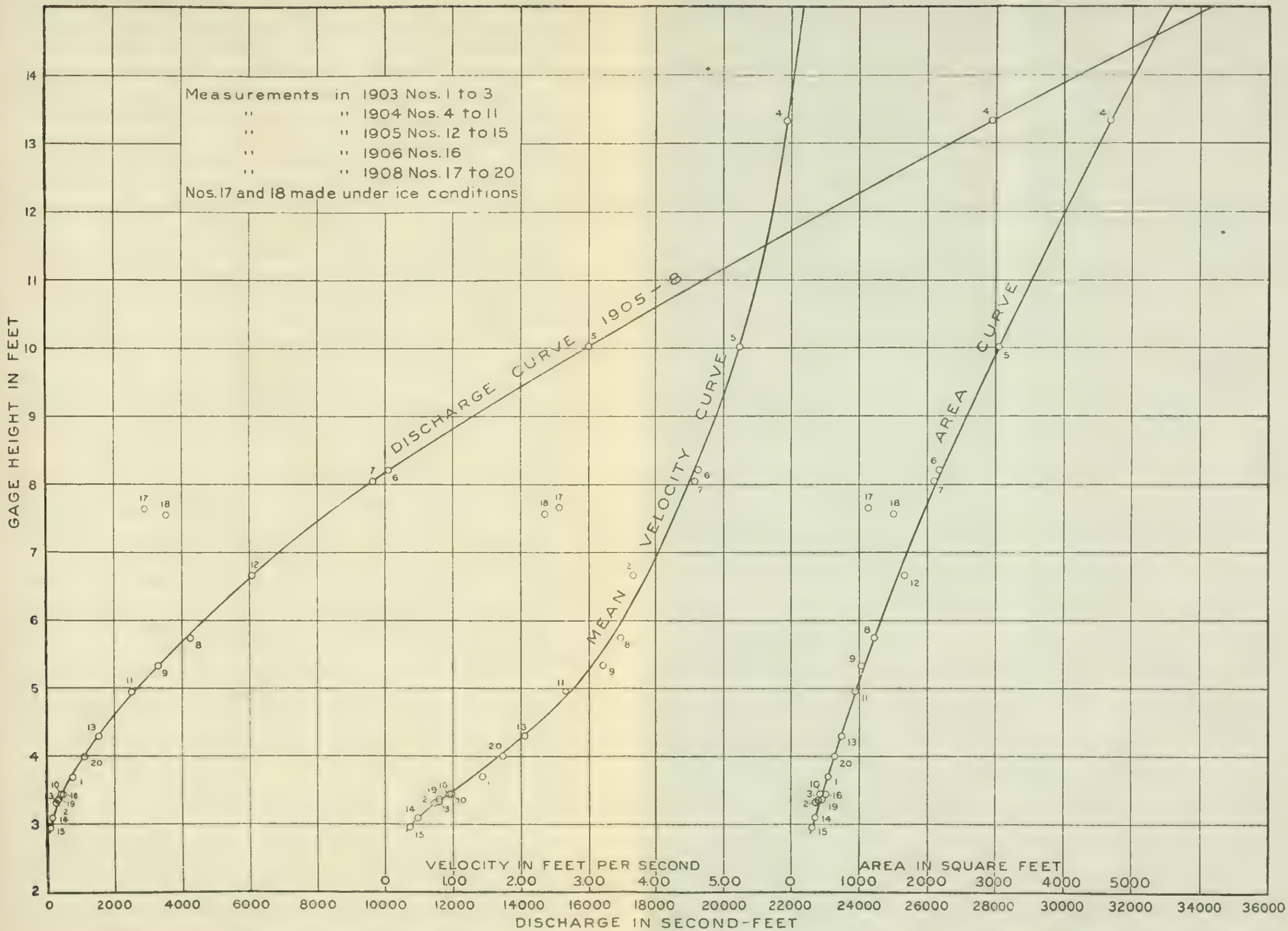
Rating curves are drawn and studied with special reference to the class of channel conditions which they represent. (See p. 17.) The discharge measurements for all classes of stations when plotted with gage heights in feet as ordinates and discharges in second-feet as abscissas define rating curves which are more or less generally parabolic in form. In many cases curves of area in square feet and mean velocity in feet per second are also constructed to the same scale of ordinates as the discharge curve. These are used mainly to extend the discharge curves beyond the limits of the plotted discharge measurements, and for checking purposes to avoid errors in the form of the discharge curve and to determine and eliminate erroneous measurements.

For every published rating table the following assumptions are made for the period of application of the table: (*a*) That the discharge is a function of and increases gradually with the stage; (*b*) that the discharge is the same whenever the stream is at a given stage, and hence such changes in conditions of flow as may have occurred during the period of application are either compensating or negligible, except that the rating as stated in the footnote of each table is not applicable for known conditions of ice, log jams, or other similar obstructions; (*c*) that the increased and decreased discharge due to change of slope on rising and falling stages is either negligible or compensating.

As already stated, the gaging stations may be divided into several classes, as indicated in the following paragraphs:

The stations of class 1 represent the most favorable conditions for an accurate rating and are also the most economical to maintain. (See Pl. III.) The bed of the stream is usually composed of rock and is not subject to the deposit of sediment and loose material. This class includes also many stations located in a pool below which is a permanent rocky riffle that controls the flow like a weir. Provided the control is sufficiently high and close to the gage to prevent cut and fill at the gaging point from materially affecting the slope of the water surface, the gage height will for all practical purposes be a true index of the discharge. Discharge measurements made at such stations usually plot within 2 or 3 per cent of the mean discharge curve and the rating developed from that curve represents a very high degree of accuracy.

Class 2 is confined mainly to stations on rough mountainous streams with steep slope. The beds of such streams are as a rule comparatively permanent during low and medium stages, and when the flow is sufficiently well defined by an adequate number of discharge measurements before and after each flood the stations of this class



DISCHARGE, AREA, AND MEAN-VELOCITY CURVES FOR AROOSTOOK RIVER AT FORT FAIRFIELD, ME.

give nearly as good results as those of class 1. As it is seldom possible to make measurements covering the time of change at flood stage, the assumption is often made that the curves before and after the flood converged to a common point at the highest gage height recorded during the flood. Hence the only uncertain period occurs during the few days of highest gage heights covering the period of actual change in conditions of flow. (See Water-Supply Paper 246.)

Class 3 includes most of the current-meter gaging stations maintained by the United States Geological Survey. If sufficient measurements could be made at stations of this class results would be obtained nearly equaling those of class 1, but owing to the limited funds at the disposal of the Survey this is manifestly impossible, nor is it necessary for the uses to which discharge data are applied. The critical points are as a rule at relatively high or low stages. The percentage error, however, is greater at low stages. No absolute rule can be laid down for stations of this class. Each rating curve must be constructed mainly on the basis of the measurements of the current year, the engineer being guided largely by the past history of the station and the following general law. If all measurements ever made at a station of this class are plotted on cross-section paper, they will define a mean curve which may be called a "standard curve." It has been found in practice that if after a change caused by high stage a relatively constant condition of flow occurs at medium and low stages, all measurements made after the change will plot on a smooth curve which is practically parallel to the standard curve with respect to their ordinates, or gage heights. This law of the parallelism of ratings is the fundamental basis of all ratings and estimates at stations with semipermanent and shifting channels. It is not absolutely correct, but, with few exceptions, answers all the practical requirements of estimates made at low and medium stages after a change at a high stage. This law appears to hold equally true whether the change occurs at the measuring section or at some controlling point below. The change is, of course, fundamentally due to change in the channel caused by cut or fill, or both, at and near the measuring section. For all except small streams the changes in section usually occur at the bottom. The following simple but typical examples illustrate this law:

(*a*) If 0.5 foot of planking were to be nailed on the bottom of a well-rated wooden flume of rectangular section there would result, other conditions of flow being equal, new curves of discharge, area, and velocity, each plotting 0.5 foot above the original curves when referred to the original gage. In other words, this condition would be analogous to a uniform fill or cut in a river channel which either reduces or increases all three values of discharge, area, and velocity

for any given gage height. In practice, however, such ideal conditions rarely exist.

(*b*) In the case of a cut or fill at the measuring section there is a marked tendency toward decrease or increase, respectively, of the velocity. In other words, the velocity has a compensating effect, and if the compensation is exact at all stages the discharge at a given stage will be the same under both the new and the old conditions.

(*c*) In the case of uniform change along the crest of a weir or rocky controlling point, the area curve will remain the same as before the change, and it can be shown that here again the change in velocity curve is such that it will produce a new discharge curve essentially parallel to the original discharge curve with respect to their ordinates.

Of course in actual practice such simple changes of section do not occur. The changes are complicated and lack uniformity, a cut at one place being largely offset by a fill at another, and vice versa. If these changes are very radical and involve large percentages of the total area—as, for example, on small streams—there may result a wide departure from the law of parallelism of ratings. In complicated changes of section the corresponding changes in velocity which tend to produce a new parallel discharge curve may interfere with each other materially, causing eddies, boils, backwater, and radical changes in slope. In such extreme conditions, however, the measuring section would more properly fall under class 4 and would require very frequent measurements of discharge. Special stress is laid on the fact that in the lack of other data to the contrary the utilization of this law will yield the most probable results.

Slight changes at low or medium stages of an oscillating character are usually averaged by a mean curve drawn among them parallel to the standard curve, and if the individual measurements do not vary more than 5 per cent from the rating curve the results are considered good for stations of this class. For illustrative example of a station of this type, see Water-Supply Paper 242.

Class 4 comprises stations that have soft, muddy, or sandy beds. Good results can be obtained from such sections only by frequent discharge measurements, the frequency varying from a measurement every two or three weeks to a measurement every day, according to the rate of diurnal change in ocnditions of flow. These measurements are plotted and a mean or standard curve drawn among them. It is assumed that there is a different rating curve for every day of the year and that this rating is parallel to the standard curve with respect to their ordinates. On the day of a measurement the rating curve for that day passes through that measurement. For days between successive measurements it is assumed that the rate of change is uniform, and hence the ratings

for the intervening days are equally spaced between the ratings passing through the two measurements. This method must be modified or abandoned altogether under special conditions. Personal judgment and a knowledge of the conditions involved can alone dictate the course to pursue in such cases. For illustrative example of a station of this type, showing the Bolster method of determining the daily discharge graphically, see Water-Supply Papers 247 and 249.

The computations have, as a rule, been carried to three significant figures. Computation machines, Crelle's tables, and the 20-inch slide rule have been generally used. All computations are carefully checked.

After the computations have been completed they are entered in tables and carefully studied and intercompared to eliminate or account for all gross errors so far as possible. Missing periods are filled in, so far as is feasible, by means of comparison with adjacent streams. The attempt is made to complete years or periods of discharge, thus eliminating fragmentary and disjointed records. Full notes accompanying such estimates follow the monthly discharge tables.

For most of the northern stations estimates have been made of the monthly discharge during frozen periods. These are based on measurements under ice conditions wherever available, daily records of temperature and precipitation obtained from the United States Weather Bureau, climate and crop reports, observers' notes of conditions, and a careful and thorough intercomparison of results with adjacent streams. Although every care possible is used in making these estimates they are often very rough, the data for some of them being so poor that the estimates are liable to as much as 25 to 50 per cent error. It is believed, however, that estimates of this character are better than none at all, and serve the purpose of indicating in a relative way the proportionate amount of flow during the frozen period. These estimates are, as a rule, included in the annual discharge. The large error of the individual months has a relatively small effect on the annual total, and it is for many purposes desirable to have the yearly discharge computed, even though some error is involved in doing so.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous

tests and experiments have been made to test the accuracy of current-meter work. These show that it compares very favorably with the results from standard weirs, and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where uncertainty regarding the coefficient and complicated conditions of flow prevail.

The work is, of course, dependent on the reliability of the observers. With relatively few exceptions, the observers perform their work honestly. Care is taken, however, to watch them closely and to inquire into any discrepancies. It is, of course, obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the rating tables and an accuracy column is inserted in the monthly discharge table. In the rating tables "well defined" indicates in general that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly-discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

In general the policy is followed of making available for the public the base data which are collected in the field each year by the Survey engineers. This is done to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed

results of earlier years. It is therefore expected that the engineer who makes serious use of the data given in these papers will verify all ratings and make such adjustments in earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for five or ten year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The values in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates. This is particularly true of the maximum and minimum figures, which in the very nature of the method of collecting these data are liable to large errors. The maximum value should be increased considerably for many stations in considering designs for spillways, and the minimum value should be considered for a group of, say, seven days and not for one day.

The rating table, provided the engineer accepts it, is published primarily to allow him to apply it directly to the daily gage heights and rearrange the daily discharges in order of magnitude or by some other method.

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NEW ENGLAND.

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chief engineer of Little River water supply; John T. Henderson, deputy chief engineer Connecticut River bridge and highway district.

NEW YORK.

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DIVISION OF WORK.

The field data for New England and New York were collected under the direction of H. K. Barrows, district engineer, assisted by F. E. Pressey and D. M. Wood, assistant engineers, and G. M. Brett, C. R. Adams, A. D. Butterfield, R. A. Mention, and H. F. French.

Except as otherwise stated in the descriptions, computations of discharge for stations located at dams, and ratings, computations, and special studies, prepared in advance for the New York State Water Supply Commission, and some few other stations in New England and New York, were made by H. K. Barrows.

All other ratings, ice estimates, special estimates, studies of the completed data and computations for New England and New York were made and prepared for publication by R. H. Bolster, assistant engineer, assisted by H. D. Padgett, G. C. Stevens, G. L. Parker, and M. I. Walters.

The field data for the Middle Atlantic States were collected under the direction of John C. Hoyt, assistant chief hydrographer, assisted by A. H. Horton, C. C. Covert, R. H. Bolster, and Robert Follansbee,

assistant engineers, and F. F. Henshaw, G. C. Stevens, and A. T. Barrows, junior engineers.

Ratings, ice and special estimates, studies of the completed data, and computations for the Middle Atlantic States were made and prepared for publication by R. H. Bolster, assistant engineer, assisted by H. D. Padgett, G. C. Stevens, and M. I. Walters.

The manuscript for New England and New York was reviewed by H. K. Barrows, and that for New York was reviewed also by C. C. Covert. The complete manuscript was edited by Mrs. B. D. Wood.

NORTH ATLANTIC COAST DRAINAGE.

ST. JOHN RIVER DRAINAGE BASIN.

DESCRIPTION.

St. John River drains the largest basin between the St. Lawrence and Susquehanna rivers. Its extreme headwaters lie in the mountainous region between Maine and Canada, adjacent to those of the Penobscot. From the junction of the northwest and southwest branches, where the river first takes its name, to its junction with St. Francis River, a distance of 90 miles, its course is in general northeastward and lies wholly in Maine, although a portion of the tributary drainage area lies wholly in Canada. In this distance it receives Allegash River, its second largest tributary. From its junction with the St. Francis the St. John flows eastward, forming the northern boundary of Maine for 70 miles and receiving in this stretch two important tributaries—Fish River, from the south, at Fort Kent, and Madawaska River, from the north, at Madawaska. At the point where the St. John leaves the state line its drainage area measures 8,765 square miles, of which 4,670 square miles are in Maine and 4,095 square miles are in Canada. Beyond this point it flows southward and receives the waters of Aroostook, Presque Isle, and Meduxnekeag rivers, the basins of which are almost entirely in Maine. From source to mouth its length is about 450 miles, and its total drainage area measures about 26,000 square miles.

In the eastern or lower portion of the basin the country is almost level near the river, but at a distance from the stream it becomes undulating and moderately hilly, finally subsiding and merging into the flat country bordering Aroostook rivers. Above the mouths of St. Francis and Allegash rivers the aspect of the basin is diversified by highlands.

The basin of the St. John is higher than that of any other river in the State, but as its elevation is quite uniform, the fall of the stream and the possibilities for the development of water power are less than on the other great rivers. Allegash River, which drains about 1,500 square miles of entirely wild and forest country, has considerable fall and affords excellent storage facilities, all unutilized.

The area as a whole is well forested. Large tracts have never been touched by the ax, and other portions have been lumbered for pine only. Probably 90 per cent of the whole basin tributary to the St. John at the eastern boundary of Maine is in forest.

The prevailing rocks in the eastern part of the area are limestones and slate, with patches of sandstone, coarse rock, and granite. Clays and slates are found over about 75 per cent of the total area.

According to Wells,[a] the ponds and lakes in the St. John basin have an aggregate area of 314 square miles, the largest of these lakes being tributary to Allegash and Fish rivers. On some of the lakes rough timber crib dams are used to store water for log driving, but no attempt is made to store water after the driving season is over. Previous to 1845 a canal was cut from Telos Lake, in the Allegash basin, to Webster Lake, in the Penobscot basin, and a dam was constructed between Chamberlain and Eagle lakes. In this way Chamberlain Lake, with its drainage area of 270 square miles, was rendered in part tributary to the Penobscot. This diversion continues at the present time. Its general effect is to supply most of the water to the Penobscot during the log-driving season, but after the gates at the dams are opened more water flows toward the St. John, as the gate sills are about 2 feet lower than those at Telos Lake.

Precipitation records in the basin of the St. John are very meager, but from the best information available it seems probable that the mean annual rainfall is not over 30 to 35 inches.

The river and its tributaries are completely frozen over during the winter season, which usually extends from the 1st of November until after the middle of April, and provides a large amount of snow storage.

The following gaging stations have been maintained in this basin:

St. John at Fort Kent (1905–1908).
Fish at Wallagrass (1903–1908).
Aroostook at Fort Fairfield (1903–1908).

The records available for these stations, although not complete, indicate 1905 as the year of minimum flow and also extreme low water, the mean annual discharge for that year being perhaps one-half as great as in 1904.

ST. JOHN RIVER AT FORT KENT, ME.

This station, which is located at the footbridge that crosses the St. John near Fort Kent post-office, a short distance above the confluence of Fish River with the St. John, was established October 13, 1905, to obtain general statistical data regarding flow. It is about 15 miles below the mouth of St. Francis River and about 50

[a] Wells, Walter, Water powers of Maine, 1869.

miles above Grand Falls, an important undeveloped power. Numerous power sites exist along the river. The datum of the gage has remained the same during the maintenance of the station. During the winter months the discharge is affected by ice. The discharge is also at times affected by log jams which occasionally form in the river in the vicinity of the station, especially on the bridge piers.

Conditions for obtaining accurate results are fair, and a fairly good rating curve has been developed.

Discharge measurements of St. John River at Fort Kent, Me., in 1907–1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907.					
May 29 [a]	F. E. Pressey	696	5,750	11.00	28,700
1908.					
April 1 [b]	F. E. Pressey	646	1,700	7.03	3,850
October 9	do	547	1,250	3.22	1,290
November 29 [c]	do	368	887	3.16	1,270
1909.					
May 13 [d]	F. E. Pressey	715	11,800	19.40	75,000
June 24	do	654	3,110	6.38	9,560

[a] Logs running
[b] Measurement made under ice cover. Average thickness of ice, 2.1 feet; gage height to top of ice, 7.18 feet.
[c] Anchor ice running; measurement not materially affected.
[d] Rough gaging based on current meter observations in right span and surface velocity of logs in left span; bridge partially wrecked and unsafe.

Daily gage height, in feet, of St. John River at Fort Kent, Me., for 1907–8.

[Mrs. M. D. Russell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1			3.9		12.8	10.8	8.5	7.8	3.4	4.05	9.25	
2					15.3	10.25	8.55	7.65	3.35	4.0	8.35	5.15
3					15.5	9.7	8.6	7.6	3.3	4.0		
4					15.2	9.0	8.5		3.35	4.0	8.6	
5				5.7	14.45	8.7	8.4	7.15	3.65	4.1	10.0	
6					13.7	8.3	7.45	6.75	4.2		9.6	
7					12.6	8.6		6.3	4.3	4.35	9.45	
8			3.9		12.3	9.3	6.45	5.75		4.65	10.25	
9					12.0	9.25	6.25	5.55	4.05	5.5	11.45	
10					12.0	8.85	6.45	5.5	3.9	7.8		4.85
11				6.0	12.3	8.55	7.05		3.8	7.6	10.0	5.9
12					12.25	8.05	6.85	5.1	3.85	7.2	9.25	7.85
13					12.0	7.45	6.6	5.0	4.1	6.9	8.45	8.9
14					11.7	7.05		4.95	4.55	6.8	7.85	7.2
15			3.9		11.9	6.65	7.35	4.6	4.6	6.65	7.8	
16		4.1		6.35	13.2	6.4	7.05	4.5	4.5	6.3	7.2	8.0
17				6.05	13.7	5.9	6.3	4.5	4.55	6.0	6.8	7.5
18				5.5	15.5	5.8	5.95		4.95	5.65	6.65	7.0
19				5.35	16.2	5.5	5.6	4.25	5.2	5.4	6.2	7.5
20				5.15	16.7	5.65	5.3	4.15	5.05		6.05	7.5
21				5.35	16.6	6.55		4.1	4.85	4.95	5.7	7.0
22		4.1	4.1	5.45	15.8	7.35	5.05	4.1	4.6	4.85	5.35	
23				5.5	13.7		5.15	4.0	4.4	4.65	5.1	
24				5.75	12.8	6.55	5.25	3.85	4.4	4.5		
25				6.8	11.0	6.0	5.3	3.8	4.2	4.45	5.4	
26				6.5	10.15	6.0	6.95	3.8	4.2	4.5	5.5	
27				6.85	10.3	7.4	8.25	3.7	4.2		5.3	
28				8.95	9.8	10.0	8.5	3.6	4.1	4.4	5.25	
29			4.1	9.0	11.0	10.05	8.3	3.6	4.1	4.9	5.1	
30				11.7	11.9	8.8	7.85	3.5	4.1	10.45	5.1	
31					11.6		7.85	3.5		10.4		

[a] See footnote at end of table, next page.

Daily gage height, in feet, of St. John River at Fort Kent, Me., in 1907–8—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1		6.3		7.03	15.4	12.75	5.45	3.3	3.5			4.0
2					16.45	13.0	4.6	3.3	3.45		2.95	4.1
3						11.8	4.75	3.3	3.4		2.9	4.05
4				7.3	17.45	10.65	4.65	3.2	3.35		2.85	
5					16.5	9.7	4.55	3.3	3.1		2.8	
6		6.2			16.0	8.8	4.4	3.4			2.75	
7			6.2		16.25		4.4	3.5		3.05	2.7	
8					16.35	7.45	4.35	3.65		3.35		
9				7.1	16.2	7.3	4.25			3.3	2.6	
10						7.1	4.3	3.75		3.1	2.6	
11					15.3	6.8	4.55	3.8		3.05	2.55	
12			6.1		15.1	6.5	4.6	3.7		3.05	2.55	
13		5.9			15.0	6.1	4.55	3.7		3.0	2.6	
14					15.3	5.6	4.4	3.8		3.0	2.6	
15					15.7	5.5	4.3	3.9		3.0		
16				7.6	15.35	6.15	4.15			3.0		
17		6.45				7.15	4.1	4.05		3.0		
18	7.8	6.3			15.2	8.3	3.95	4.1				
19			6.5		15.6	9.05		4.35		3.0		
20					15.4	9.15	3.6	5.3		3.0		
21	7.5				15.25		3.5	5.55		3.0		
22		6.8			13.95	9.2	3.6	5.15		3.0		
23					12.9	8.35	3.7			3.05		
24						7.9	3.65	4.4		3.1		
25	6.8				11.1	7.45	3.6	4.35				
26			6.5		10.4	6.55		4.3		3.1		
27		6.7			9.65	5.65	3.9	4.0		3.1	3.0	
28				9.85	10.65		3.8	3.7		3.15	3.0	
29				11.4	10.8	5.45	3.65	3.55		3.15	3.05	
30				18.05	10.25	5.35	3.55		[a] 2.4	3.05	3.4	
31							3.45	3.5		3.0		4.9

[a] Gage height estimated September 30, 1908, on the basis of observer's note to the effect that the water surface was 0.6 foot below the gage.

NOTE.—River frozen January 1 to April 15, 1907. Discharge also probably affected by ice April 16 and 17. Discharge probably not affected by ice December 1 to 14, 1907. River open December 15 to 31, 1907, except around the gage; discharge probably affected by ice conditions.

River open except at the gage January 1 to 14, 1908; discharge probably affected by ice conditions. River frozen over January 15 to April 28, 1908; ice running April 29 and 30. River frozen over December 4 to 31, 1908. Gage heights during the frozen periods read to water surface in a hole cut in the ice. Discharge affected by log jam near gage May 14 to 25, 1908. Water below gage September 6 to October 6, October 18, October 25, and November 1 to 26, 1908. Gage heights recorded during these periods were estimated by the observer.

Rating table for St. John River at Fort Kent, Me., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.40	500	4.00	2,700	5.60	6,890	8.40	17,530
2.50	560	4.10	2,910	5.70	7,210	8.60	18,380
2.60	630	4.20	3,130	5.80	7,540	8.80	19,240
2.70	710	4.30	3,350	5.90	7,880	9.00	20,100
2.80	800	4.40	3,580	6.00	8,220	10.00	24,550
2.90	910	4.50	3,820	6.20	8,920	11.00	29,200
3.00	1,030	4.60	4,060	6.40	9,640	12.00	34,000
3.10	1,160	4.70	4,310	6.60	10,370	13.00	39,000
3.20	1,300	4.80	4,570	6.80	11,110	14.00	44,180
3.30	1,450	4.90	4,830	7.00	11,870	15.00	49,500
3.40	1,600	5.00	5,100	7.20	12,640	16.00	55,000
3.50	1,760	5.10	5,380	7.40	13,420	17.00	60,700
3.60	1,930	5.20	5,670	7.60	14,220	18.00	66,600
3.70	2,110	5.30	5,970	7.80	15,030	19.00	72,600
3.80	2,300	5.40	6,270	8.00	15,850	20.00	78,700
3.90	2,500	5.50	6,580	8.20	16,690		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 8 discharge measurements made during 1905–1909 and is well defined.

Monthly discharge of St. John River at Fort Kent, Me., for 1907–8.

[Drainage area, 5,280 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January			1,000	0.189	0.22	D.
February			750	.142	.15	D.
March			750	.142	.16	D.
April	32,500		6,700	1.27	1.42	B.
May	59,000	23,600	39,800	7.54	8.69	A.
June	28,300	6,580	15,600	2.95	3.29	A.
July	18,400	5,240	11,900	2.25	2.59	A.
August	15,000	1,760	5,750	1.09	1.26	A.
September	5,670	1,450	3,210	.608	.68	A.
October	26,600	2,700	7,510	1.42	1.64	A.
November	31,300	5,380	14,500	2.75	3.07	A.
December	19,700		6,180	1.17	1.35	C.
The year	59,000		9,470	1.79	24.52	
1908.						
January			2,790	.528	.61	D.
February			1,410	2.67	.29	D.
March			2,530	.479	.55	D.
April	66,900		7,760	1.47	1.64	C.
May	63,300	23,000	41,200	7.80	8.99	B.
June	39,000	6,120	16,100	3.05	3.40	A.
July	6,420	1,680	3,040	.576	.66	A.
August	6,740	1,300	2,690	.509	.59	A.
September	1,760	500	921	.174	.19	C.
October	1,520		1,050	.199	.23	B.
November	1,600	595	825	.156	.17	C.
December			1,200	.227	.26	D.
The year	66,900		6,790	1.29	17.58	

NOTE.—Discharge during ice conditions 1907–8 based on climatological reports of the United States Weather Bureau, the discharge from other drainages in northern Maine, and one measurement made under ice conditions.

	Second-feet.
Discharge, April 1 to 17, 1907	3,030
December 15 to 31, 1907	5,030
April 1 to 28, 1908	4,820
December 4 to 31, 1908	1,010

Discharge 1907–8 interpolated for days when the gage was not read except that during the periods in 1908, when the water surface was below the gage, it was estimated on the basis of general run-off conditions in northern Maine.

Discharge affected by log jams May 14 to 25, 1908, estimated on the basis of the discharge of Aroostook River at Fort Fairfield.

	Second-feet.
Discharge, May 14 to 25, 1908	33,000
September 6 to 29, 1908	808
October 1 to 6, 1908	800
October 18 and 25, 1908	950
November 1, 1908	1,000
November 15 to 26, 1908	800

FISH RIVER AT WALLAGRASS, ME.

Fish River, which enters the St. John from the south at Fort Kent, is naturally endowed with excellent storage facilities, in the Eagle and Portage Lake systems, which have not yet been utilized, and some good power sites are also found on this river. The low-water flow in unit run-off is very small under present conditions, but with a proper utilization of storage the river could be much improved.

The gaging station, which was established July 29, 1903, to obtain general statistical and comparative data regarding the total flow of the stream, is located just below the outlet of Wallagrass Stream, in Wallagrass, Me., near Soldier Pond post-office, at a point about 7 miles south of Fort Kent and 4 miles below Eagle Lake.

The gage datum has remained unchanged during the maintenance of the station. During the winter months the discharge is affected by ice.

Conditions for obtaining accurate results are good, and a well-defined rating curve has been developed.

Discharge measurements of Fish River at Wallagrass, Me., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.[a]	Gage height.[b]	Thickness of ice.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Feet.*	*Feet.*	*Sec.-ft.*
February 13	F. E. Pressey	110	253	4.40	4.90	1.35	236
Do	do	110	244	4.40	4.90	1.35	234
March 28	do	110	253	4.62	4.62	1.7	227
Do[c]	do	110	246	4.62	4.62	1.7	225
May 30	do	170	1,410	10.55			5,060
1908.							
February 18	F. E. Pressey	140	386	6.45	6.55	1.3	486
March 31	do	130	457	4.74			778
October 8	do	104	231	2.49			186
November 28	do	96	191	(d)			97.3

[a] To water surface.
[b] To top of ice.
[c] Some open channel and ice unsafe in places.
[d] Gage height doubtful.

Daily gage height, in feet, of Fish River at Wallagrass, Me., for 1907–8.

[Vital E. Michaud, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1				4.0		10.2	6.9	7.2	4.5	4.4	6.0	
2	4.2	5.1	4.1		10.0						6.3	6.0
3				3.6		9.7	6.9	7.2	4.6	4.7		5.8
4				3.6	11.2	9.4	6.9				7.0	
5								7.6	4.7	5.0		5.4
6				3.4	11.9	8.8	6.8			5.2	7.5	
7					12.0			7.7	4.7			4.6
8		4.8		3.6		8.8	6.8			5.6	8.0	
9			4.7		11.8		6.8	7.4	4.6		8.5	4.8
10	4.3			3.6		8.5		7.3	4.4	6.0		5.2
11				3.6	11.6		6.8				8.6	
12						8.5		7.1	4.3	6.2		5.8
13		4.4		3.7	11.9	8.5	6.8				8.4	
14								7.0	4.2	5.2		5.8
15				3.8	12.0	8.3	6.7	6.8			8.3	
16		4.4	4.6		12.0		6.6		4.4	5.3	8.0	
17				4.0		8.1		6.6				6.5
18					12.0		6.4		4.4	5.7	7.9	
19	5.5			4.2		7.9		6.8		6.0		6.7
20				4.2	12.5	7.6	6.3		4.5		7.6	
21					13.1			6.8		5.8		6.6
22				4.6		7.5	6.2	6.8	4.5		7.2	6.8
23		4.2	4.6	4.8	12.5		6.1			5.5	6.1	
24						7.2		6.7	4.4			7.0
25	5.1			5.5	12.2	7.1	6.1			5.4	6.8	

[a] See footnote at end of table, next page.

Daily gage height, in feet, of Fish River at Wallagrass, Me., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
1907.												
26								6.5	4.3	5.3		7.2
27				6.3	11.0	6.9	6.1				6.7	
28			4.6		10.5			5.5	4.2	5.8		7.3
29				7.0		6.7	6.3		4.2		6.5	
30				7.8	10.5			4.9		5.9	6.2	7.1
31							6.6	4.7				7.1
1908.												
1	6.8	5.3				9.9		3.4	3.6			
2	6.8			5.2	11.6	9.6	5.2	3.4				
3	6.0								3.6			
4	6.0		6.4	5.4	12.3	9.4	4.9	3.4				
5									3.6			
6	5.0			5.5	12.9	9.2	4.8	3.4	3.6			
7			6.6	5.6								
8	5.0	5.2			13.7	8.7	4.6	3.4	3.3			
9				5.7	14.1							
10	5.3		6.6			8.4	4.5	3.5	3.1			
11				5.9	13.7		4.5					
12		7.4				7.5		3.7	2.8			
13	5.1			5.9	13.7	6.9	4.2		2.6			
14			6.8					3.7				
15	5.1			5.9	13.9	6.6	3.9		2.6			
16				5.9	13.9			3.7				
17	5.3		6.0			6.3	3.6		2.6			
18		6.4		6.0	13.1			3.7				
19						6.6	3.5		2.7			
20	5.3		5.2	6.0	12.7			3.7	2.7			
21						6.5	3.4					
22		6.2		6.1	12.2		3.4	3.7	2.7			
23			5.0			6.3			2.7			
24				6.4	11.8		3.4	3.6				
25	5.3				11.6	6.1			2.8			
26			4.7	6.8			3.4	3.6	2.8			
27					10.9	5.9			2.7			
28	5.2		5.8	9.0			3.4	3.5				
29		6.5	5.7		10.6	5.6			2.7			
30				9.9		5.4	3.4	3.5				
31			5.4									

NOTE.—River frozen January 1 to March 31, 1907; ice conditions prevailed about December 15, 1907, to January 17, 1908. River frozen over January 18 to about April 3, 1908, being partially open during the latter part of March. Also frozen over about December 8 to 31, 1908. Gage heights during the frozen periods read to water surface in a hole cut in the ice. Gage heights June to September, 1908, have been corrected 0.4 foot, account of settling of gage due to caving banks. They are liable to considerable error. Gage heights October to December, 1908, were unreliable, and hence are omitted.

Rating table for Fish River at Wallagrass, Me., for July 29, 1903, to September 30, 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.60	203	4.00	642	5.40	1,268	7.60	2,599
2.70	227	4.10	681	5.50	1,320	7.80	2,738
2.80	252	4.20	721	5.60	1,372	8.00	2,880
2.90	279	4.30	762	5.70	1,425	8.20	3,025
3.00	307	4.40	803	5.80	1,479	8.40	3,174
3.10	336	4.50	845	5.90	1,534	8.60	3,328
3.20	366	4.60	888	6.00	1,590	8.80	3,487
3.30	397	4.70	932	6.20	1,705	9.00	3,650
3.40	429	4.80	977	6.40	1,824	10.00	4,520
3.50	462	4.90	1,023	6.60	1,946	11.00	5,490
3.60	496	5.00	1,070	6.80	2,071	12.00	6,550
3.70	531	5.10	1,118	7.00	2,200	13.00	7,650
3.80	567	5.20	1,167	7.20	2,331	14.00	8,850
3.90	604	5.30	1,217	7.40	2,464		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903 to 1908 and is well defined.

Monthly discharge of Fish River at Wallagrass, Me., for 1907–8.

[Drainage area, 890 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	.....	300	0.337	0.39	D.
February	.....	.....	220	.247	.26	D.
March	.....	.....	220	.247	.28	D.
April	2,740	429	881	.990	1.10	B.
May	7,770	3,630	6,130	6.89	7.94	A.
June	4,700	2,010	3,040	3.42	3.82	A.
July	2,140	1,650	1,920	2.16	2.49	A.
August	2,670	932	2,070	2.33	2.69	A.
September	932	721	819	.920	1.03	A.
October	1,640	803	1,330	1.49	1.72	A.
November	3,330	1,590	2,480	2.79	3.11	A
December	1,640	.....	1,080	1.21	1.40	C.
The year	7,770	.....	1,710	1.92	26.23	
1908.						
January	.....	.....	600	.674	.78	D.
February	.....	.....	339	.381	.41	D.
March	.....	.....	412	.463	.53	D.
April	4,430	800	1,790	2.01	2.24	A.
May	8,970	4,650	7,090	7.97	9.19	A.
June	4,430	1,270	2,490	2.80	3.12	C.
July	1,220	429	670	.753	.87	C.
August	531	429	485	.545	.63	C.
September	496	203	302	.339	.38	C.
October	.....	.....	150	.169	.19	D.
November	.....	.....	120	.135	.15	D.
December	.....	.....	150	.169	.19	D.
The year	8,970	.....	1,220	1.37	18.68	

NOTE.—Discharge during ice conditions, 1907–8, based on climatological reports, the discharge of other drainages in northern Maine, and five measurements made under ice conditions.

	Second-feet.
Discharge December 15 to 31, 1907	900
Discharge April 1 to 3, 1908	950

Discharge interpolated for days when the gage was not read. Discharge October to December, 1908, estimated on the basis of two measurements and general run-off conditions in Maine.

AROOSTOOK RIVER AT FORT FAIRFIELD, ME.

The sources of Aroostook River lie adjacent to those of the Mattawamkeag and the East Branch of the Penobscot. Although its drainage area is large—2,350 square miles, nearly all in Maine—its flow is quite variable, because of lack of storage facilities. During the low-water season, which frequently occurs in both the fall and midwinter, its flow has been known to reach a minimum of 0.06 second-foot per square mile, a remarkably low figure for so large a stream in the East. Considerable fall is available, and during 1907 the Aroostook Falls, with a head of about 75 feet, just across the boundary line in New Brunswick, have been developed for light and power purposes.

The gaging station, which was established July 31, 1903, to obtain general statistical data regarding the flow of the river, is located at the steel highway bridge in the village of Fort Fairfield, about 3 miles from the international boundary line and about 8 miles below the mouth of Little Madawaska Stream. The nearest dam is that at Aroostook Falls, above referred to.

The datum of the gage has remained unchanged during the maintenance of the station. During the winter months the discharge is affected by ice and only weekly observations of gage heights are made. Conditions for accurate determinations of discharge are good, and an excellent rating curve has been developed. (See Pl. III.)

Discharge measurements of Aroostook River at Fort Fairfield, Me., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.[a]	Gage height.[b]	Thickness of ice.	Discharge.
		Feet.	*Sq.-ft.*	*Feet.*	*Feet.*	*Feet.*	*Sec.-ft.*
February 20	F. E. Pressey	365	1,140	7.65	7.65	2.1	2,930
April 3	do	[c]396	1,500	7.57	7.77	1.7	3,560
October 6	do	272	453	3.37			363
December 1	do	282	647	4.00			1,120

[a] To water surface. [b] To top of ice. [c] Fifty-six feet width of open channel.

Daily gage height, in feet, of Aroostook River at Fort Fairfield, Me., for 1907–8.

[F. E. Peterson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1					15.0	7.5	6.05	8.8	3.95	4.65	6.4	4.55
2		5.1			14.9	6.95	7.0	9.0	3.9	4.45	6.3	4.45
3					14.55	6.65	7.2	9.5	4.0	4.45	6.0	4.45
4			4.9		13.8	6.35	7.4	9.1	4.1	4.6	7.25	4.5
5					12.7	6.05	6.85	8.95	4.3	4.6	7.9	4.6
6	5.0				11.15	7.2	6.4	8.8	4.5	4.6	7.9	4.6
7					10.85	7.9	6.4	8.8	4.75	4.6	8.5	4.65
8		5.1			10.75	8.05	6.05	8.35	5.0	4.6	8.7	4.7
9					10.5	9.2	6.5	8.1	5.2	5.3	8.7	5.5
10					10.6	9.0	6.8	7.3	4.85	6.25	8.6	6.0
11					10.4	8.65	7.0	6.95	4.55	6.45	8.55	6.45
12			5.0		10.3	8.05	6.6	6.25	5.25	6.4	8.1	10.3
13	5.1				10.1	7.4	6.3	5.4	5.3	6.1	7.8	10.2
14					9.75	6.8	6.1	5.1	5.05	5.95	7.4	8.4
15					9.65	6.35	6.5	5.05	5.05	5.7	6.9	7.6
16		5.0			9.6	5.95	6.75	4.9	4.85	5.45	6.45	7.45
17					9.85	5.9	6.25	4.5	4.9	5.25	6.0	7.0
18					10.55	5.5	6.1	4.3	4.9	5.25	6.0	6.7
19					10.75	5.4	5.85	4.2	4.85	5.05	6.05	6.55
20	5.0				10.8	5.3	5.45	4.1	4.8	4.85	5.65	6.65
21			5.1		10.55	5.3	5.25	4.0	4.6	4.8	5.25	6.2
22					10.15	6.55	5.25	4.0	4.75	4.95	5.25	6.0
23		5.0			9.55	5.9	5.1	4.0	4.55	5.0	5.6	5.85
24	5.0				8.65	5.6	4.85	4.15	4.7	5.85	5.1	5.5
25					8.1	5.5	5.15	4.25	4.95	5.45	5.0	5.6
26	5.1				7.75	5.45	5.7	4.45	5.05	4.85	5.0	5.6
27				12.4	7.35	5.6	6.05	4.5	5.3	4.4	5.25	5.75
28				12.95	7.0	5.85	6.55	4.45	5.25	4.45	4.6	5.45
29				13.85	7.35	6.0	7.1	4.25	4.95	4.8	4.3	5.7
30			5.1	14.55	8.15	5.9	7.1	4.15	4.8	6.25	4.45	5.85
31					8.05		7.75	4.0		6.4		5.25
1908.												
1		6.5			13.5	10.35	4.3	3.6	3.5	3.3	3.6	4.05
2					13.85	10.6	4.4	3.6		3.3	3.55	4.1
3				7.57	14.25	9.95	4.4	3.6	3.4	3.35	3.65	
4					13.85	9.15	4.2	3.6	3.45	3.45	3.75	
5					13.3	8.4	4.25	3.5	3.5	3.5	3.8	
6					12.75	7.95	4.15	3.5	3.4	3.4	3.75	
7			6.5		12.5	7.95	4.2	3.5	3.5	3.55	3.7	4.4
8		5.9			12.1	7.7	4.35	3.6	3.5	3.6	3.6	
9					12.5	7.7	4.1	3.6	3.55	3.6	3.6	
10					12.25	7.4	4.4	3.6	3.6	3.6	3.55	
11					11.55	6.95	4.15	3.9	3.45	3.6	3.5	
12					11.55	6.35	3.95	3.8	3.45	3.6	3.45	4.5
13					11.15	5.7		3.8	3.3	3.55	3.45	
14			7.1		11.2	5.2	3.75	3.8	3.25	3.45	3.5	
15		5.5			10.2	5.05	3.3	3.8	3.2	3.45	3.55	
16					9.65	4.8	3.15	3.9	3.2	3.45	3.5	
17				8.2	9.8	5.1	3.1	4.0	3.2	3.45	3.5	
18	7.3			8.25	9.45	5.65	3.3	4.0	3.2	3.4	3.5	
19				8.4	9.05	5.85	3.2	4.15	3.3	3.4	3.45	4.3
20		7.65		8.35	8.9	5.55	3.1	4.4	3.3	3.3	3.5	
21			7.3	8.3	8.6	5.55	3.35	4.5	3.3	3.3	3.5	
22				8.2	8.3	5.3	3.3	4.5	3.3	3.3	3.4	
23				7.55	8.15	5.25	3.2		3.3	3.3	3.55	
24				8.05	8.1	5.15	3.35	4.0	3.3	3.4	3.55	
25	7.2			8.8	7.75	5.1	3.35	3.9	3.3	3.35	3.4	
26				8.7	7.45		3.35	3.8	3.3	3.4	3.45	4.0
27				10.35	7.5		3.4	3.7	3.3	3.4	3.5	
28				12.25	8.35		3.5	3.65	3.3	3.4	3.55	
29		5.6		13.2			3.5	3.6	3.3	3.4	3.65	
30				13.65			3.6	3.5	3.3	3.4	3.75	
31			7.8				3.6	3.5		3.5		

NOTE.—River frozen January 1 to April 26, 1907 and ice conditions probably prevailed December 1 to 9 and 18 to 31, 1907. River also frozen January 1 to April 26 and December 2 to 31, 1908. Gage heights during the frozen periods read to water surface in a hole cut in the ice except April 17 to 26, 1908, which were to the top of the ice.

Rating table for Aroostook River at Fort Fairfield, Me., for 1905–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.10	180	4.60	1,984	6.10	4,845	8.20	10,100
3.20	240	4.70	2,150	6.20	5,060	8.40	10,710
3.30	310	4.80	2,320	6.30	5,275	8.60	11,330
3.40	390	4.90	2,494	6.40	5,495	8.80	11,960
3.50	480	5.00	2,672	6.50	5,715	9.00	12,600
3.60	580	5.10	2,854	6.60	5,940	9.20	13,240
3.70	690	5.20	3,040	6.70	6,165	9.40	13,900
3.80	810	5.30	3,230	6.80	6,395	9.60	14,560
3.90	940	5.40	3,423	6.90	6,630	9.80	15,230
4.00	1,075	5.50	3,619	7.00	6,865	10.00	15,910
4.10	1,215	5.60	3,818	7.20	7,345	11.00	19,400
4.20	1,360	5.70	4,019	7.40	7,840	12.00	23,000
4.30	1,510	5.80	4,222	7.60	8,360	13.00	26,700
4.40	1,664	5.90	4,427	7.80	8,910	14.00	30,500
4.50	1,822	6.00	4,635	8.00	9,500	15.00	34,300

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903 to 1908, and is well defined.

Monthly discharge of Aroostook River at Fort Fairfield, Me., for 1907–8.

[Drainage area, 2,230 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	.....	800	0.359	0.41	D.
February	.....	.....	500	.224	.23	D.
March	.....	.....	700	.314	.36	D.
April	32,600	.....	4,650	2.08	2.32	B.
May	34,300	6,860	17,300	7.76	8.95	A.
June	13,200	3,230	6,160	2.76	3.08	A.
July	8,770	2,410	5,350	2.40	2.77	A.
August	14,200	1,080	5,180	2.32	2.68	A.
September	3,230	940	2,290	1.03	1.15	A.
October	5,600	1,660	3,150	1.41	1.63	A.
November	11,600	1,510	6,050	2.71	3.02	A.
December	17,000	.....	4,090	1.83	2.11	B.
The year	34,300	.....	4,680	2.10	28.71	
1908.						
January	.....	.....	1,500	.673	.78	D.
February	.....	.....	1,350	.605	.65	D.
March	.....	.....	1,720	.771	.89	D.
April	29,200	.....	6,840	3.07	3.42	B.
May	31,400	7,970	17,800	7.98	9.20	A.
June	18,000	1,730	6,140	2.75	3.07	A.
July	1,660	180	793	.356	.41	A.
August	1,820	480	855	.383	.44	A.
September	580	240	360	.161	.18	A.
October	580	310	425	.191	.22	A.
November	810	390	543	.243	.27	A.
December	1,140	.....	500	.224	.26	D.
The year	31,400	180	3,240	1.45	19.79	

NOTE.—Discharge during ice conditions 1907–8 based on climatological reports, discharge of adjacent drainages, and two discharge measurements made under ice conditions.

	Second-feet.
Discharge April 1 to 26, 1907	1,000
December 1 to 9 and 18 to 31, 1907	1,560 and 2,500
April 1 to 26, 1908	4,140

Discharge May 29–31 and June 26–30, 1908, based on the discharge at adjacent stations.

ST. CROIX RIVER DRAINAGE BASIN.

DESCRIPTION.

St. Croix River is formed by two principal branches: The East Branch, also known as the Upper St. Croix, is the outlet of the Schoodic Lake system, including Grand and Spednic lakes; the West Branch is formed by the Grand Lake system, including Sysladobsis, Grand, and Big lakes. The St. Croix, including the East Branch, forms nearly half of the eastern boundary of Maine, and its total length is about 100 miles. Tributaries are small and unimportant. The total drainage area is 1,630 square miles, the East or principal branch having 690 square miles, and the West Branch 670 square miles at their junction. The river discharges into Passamaquoddy Bay.

The basin is in general lower than that of any other of the larger streams of the State flowing into the Atlantic, its headwaters having an elevation of about 540 feet.

A large part of the drainage basin is still covered with timber, and above Vanceboro and Princeton, at the foot of the two systems of lakes, the region is for the most part wild and inaccessible.

The mean annual precipitation is probably about 41 inches, varying from 44 inches at Eastport, on the coast, to 38 inches in the northern portions. The river is generally frozen over during the winter, although more subject to thaws during this season than basins that are farther inland.

The lake system of the St. Croix is the largest in the State in proportion to the drainage basin, except that of the Presumpscot, which is, however, a much smaller stream. The lake surface of the Upper St. Croix aggregates approximately 50 square miles, that of the West Branch 70 square miles in area, taking into account only the principal lakes and ponds. In fact, above Vanceboro and Princeton each branch of the river is simply a succession of lakes almost to the extreme headwaters. The total lake surface of the St. Croix is probably not less than 150 square miles, or nearly one-tenth the total drainage area.

The St. Croix is a valuable stream for water power, owing to its very uniform flow. Power has been developed at Calais, Baring, and at Woodland, principally for manufacture of pulp, paper, and lumber. Possibilities for increased storage are excellent, and a systematic regulation of water areas easily controlled by dams would make this one of the best power streams in the country.

The river is navigable as far as Calais, except for the two or three months in the year when it is frozen.

A gaging station has been maintained on the St. Croix at Woodland since 1902. While complete annual records are not available, indications are that the wettest year since 1902 was 1903, and the driest was 1905.

ST. CROIX RIVER NEAR WOODLAND, ME.

This station, which has been maintained to obtain general data regarding the total flow of the river, was originally established December 4, 1902, at a point a short distance above Sprague Falls, now called Woodland, near Baring, Me. On June 8, 1905, it was moved about 1½ miles downstream to avoid backwater effect from a paper mill and dam constructed at Sprague Falls. It is about 10 miles below the junction of the West with the East Branch, and about 14 miles above the mouth of the St. Croix River. Power developments are numerous along the river, the nearest being at Woodland above, and at Baring, 5 miles below. Backwater from the lower dam extends about 2 miles, and does not affect the flow at the station.

There is no determined relation between the gage datums at the original and final locations of the station. During the winter months the discharge is affected by ice, and in the log-driving season the discharge is sometimes materially affected by log jams. Conditions for obtaining accurate discharge at the present station location under open-channel conditions are good, and a very good rating curve has been developed.

Discharge measurements of St. Croix River near Woodland, Me., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 9	F. E. Pressey	310	1,480	9.00	4,340
1908.					
March 6[a]	F. E. Pressey	292	964	7.50	1,560
September 18[b]	do	300	1,040	7.62	1,430

[a] Discharge affected by anchor ice.
[b] Backwater caused by log jam on shoals 700 feet below cable.

Daily gage height, in feet, of St. Croix River near Woodland, Me., for 1907–8.

[Simeon Phinney, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.7						8.4	8.5		8.2	7.7	
2					10.8		8.5	8.5		8.0	7.7	
3	7.7			7.7	10.9	8.8	8.5	8.5	8.3	8.0		7.4
4		8.5			11.0	8.8	8.6		8.3	8.0	8.7	7.4
5				7.5		9.2	8.6	8.5	8.4	8.0	8.9	
6					10.5	9.3	8.6	8.5	8.4		9.0	7.4
7	7.7	9.2	9.0		10.0	9.4		8.5	8.4	8.0	9.0	7.4
8					9.6	9.5	8.4			8.1	8.9	
9	7.7			7.6	9.2		8.3	8.5	8.3	8.1	8.7	7.5
10					9.0	9.5	8.3	8.5	8.3	8.1		
11	7.7				9.0	9.6	8.3		8.3	8.1	8.1	9.6
12		9.0		7.8		9.6	8.3	8.4	8.3	8.1	8.0	9.6
13			8.0		8.7		8.3	8.4	8.2		7.9	9.1
14					8.6	9.6		8.5	8.2	8.0	7.8	9.0
15		9.0			8.4	9.6	8.3	8.4		8.0	7.7	
16				8.0	8.3			8.3	8.2	8.0	7.7	
17				8.0	8.2		8.4	8.3	8.2	8.0		8.7
18	8.7				8.2	9.0	8.4		8.2	8.0	7.6	8.4
19	8.7			8.0		8.3	8.4		8.2	8.0	7.6	8.1
20					8.5	8.3	8.4	8.3	8.2		7.5	
21	8.2	8.7			8.4	8.3		8.3	8.2	7.8	7.5	8.1
22			8.2	8.5	8.4	8.2	8.5	8.3		7.7	7.5	
23		8.5		8.9	8.4		8.6	8.3	8.2	7.5	7.5	
24	8.7			9.3			8.7	8.3	8.4	7.4		8.0
25				10.0	8.4	8.3	8.7		8.4	7.4	6.6	
26			8.2	10.0		8.3	8.7	8.3	8.4	7.4	7.4	7.9
27		9.0			8.5	8.3	8.7	8.3	8.4		7.4	
28	7.7				8.6	8.3		8.4	8.4	7.5	7.3	7.9
29			8.2	10.4	8.6	8.2	8.6	8.4		7.6		
30				10.6	8.7		8.6	8.4		7.7	7.4	
31	7.6				8.7		8.5	8.4		7.7		
1908.												
1				8.2	10.0		7.8		7.7	7.8		6.8
2	8.0			8.0	10.1	9.0	7.8		7.7	7.8	7.6	6.7
3				8.0		9.4	7.7	7.7	7.7	7.9	7.5	6.6
4				7.9	10.4	9.9	7.7	7.8	7.6		7.3	6.6
5					10.5	10.4		7.8	7.6	7.7	7.1	
6			7.7		10.4	10.3	7.6	7.8		7.7	7.1	
7				8.0	10.3		7.6	7.9	7.7	7.8		
8	8.1	7.5		8.0	10.0		7.5	7.9	7.6	7.8		6.7
9				8.1		9.6	7.4		7.6	7.7	7.0	
10				8.1				8.0	7.5		6.9	
11		7.0		8.1	10.0	9.2	7.3	8.0	7.5		6.9	6.8
12					9.8	8.6		8.1	7.5	7.7	6.8	6.9
13			7.9	8.1	9.7	8.4	7.2	8.1		7.6	6.8	
14		7.6		8.1	9.7		7.2	8.1	7.6	7.6	6.8	6.9
15				8.2	9.6	8.2	7.2	8.2	7.7	7.5		
16	8.1			8.3	9.6	8.3	7.3				6.9	7.0
17				8.3		8.3	7.3	8.1	7.7	7.4	6.9	
18				8.3			7.3	8.0	7.7		7.0	7.0
19		8.0	8.1		9.2	8.4		8.0	7.7	6.6	7.1	7.0
20				8.5	9.0	8.4	7.6	7.9		6.9		
21				8.5	8.8		7.6	7.9	7.6	7.0	7.1	
22		7.8		8.4	8.7	8.3	7.8	7.8	7.6			
23	8.0			8.3	8.6		8.0		7.7	7.0	7.1	6.9
24				8.3		8.2	8.0	7.8	7.7	7.0	7.0	
25				8.3		8.1	8.0	7.8	7.7		7.0	
26					8.4	8.1		7.8	7.7	7.0		6.7
27				9.3	8.3	8.0	7.8	7.7		7.0	6.9	
28	9.0	8.0	8.5	9.5	8.2		7.8	7.7	7.7	7.0	6.9	6.7
29				9.8	8.1	8.0	7.8		7.7	7.1		6.7
30				10.1	8.1	7.9	7.7		7.8	7.2	6.8	
31	8.3						7.7			7.6		6.7

NOTE.—Ice conditions January 10 to April 25, 1907. Discharge affected by anchor ice January 1 to about March 31 and during part of December, 1908. During the frozen seasons, 1907–8, gage heights are to water surface in a hole cut in the ice.

The discharge is frequently affected by backwater from log jams lodged on rifts below the station. No definite information regarding 1907 is available, but during the last half of 1908 it is probable that the discharge was greatly affected by jams. See discharge measurement September 18, 1908. It has been assumed that a nearly constant backwater effect existed from about June 12 to December 31, 1908.

Rating table for St. Croix River near Woodland, Me., for July 1, 1905, to December 31, 1908, except as noted below.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
6.60	950	7.60	2,090	8.60	3,650	9.60	5,640
6.70	1,050	7.70	2,230	8.70	3,830	9.70	5,860
6.80	1,150	7.80	2,370	8.80	4,010	9.80	6,090
6.90	1,250	7.90	2,510	8.90	4,200	9.90	6,320
7.00	1,360	8.00	2,660	9.00	4,390	10.00	6,550
7.10	1,470	8.10	2,810	9.10	4,590	10.20	7,020
7.20	1,590	8.20	2,970	9.20	4,790	10.40	7,500
7.30	1,710	8.30	3,130	9.30	5,000	10.60	8,000
7.40	1,830	8.40	3,300	9.40	5,210	10.80	8,510
7.50	1,960	8.50	3,470	9.50	5,420	11.00	9,030

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 9 discharge measurements made during 1905 to 1908 and is well defined.

Particular attention is called to the fact that, in addition to periods when ice conditions existed, the above table is not applicable when the discharge was affected by log jams at or below the station. Such conditions were known to exist in 1906 and 1908, the approximate dates being May 15 to October 25, 1906, and June 12 to December 31, 1908. It is not positively known that backwater conditions did not exist for portions of other years.

Monthly discharge of St. Croix River near Woodland, Me., for 1907–8.

[Drainage area, 1,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	.....	1,740	1.23	1.42	D.
February	.....	.....	971	.684	.71	D.
March	.....	.....	1,360	.958	1.10	D.
April	8,000	.....	3,120	2.20	2.46	C.
May	9,030	2,970	4,690	3.30	3.80	A.
June	5,640	2,970	4,230	2.98	3.32	A.
July	3,830	3,130	3,440	2.42	2.79	A.
August	3,470	3,130	3,300	2.32	2.68	A.
September	3,300	2,970	3,130	2.20	2.46	A.
October	2,970	1,830	2,470	1.74	2.01	A.
November	4,390	950	2,530	1.78	1.99	A.
December	5,640	1,830	2,920	2.06	2.38	A.
The year	9,030	.....	2,830	1.99	27.12	
1908.						
January	.....	.....	2,700	1.90	2.19	C.
February	.....	.....	1,800	1.27	1.37	D.
March	.....	.....	2,200	1.55	1.79	C.
April	6,780	2,510	3,360	2.37	2.64	A.
May	7,750	2,810	5,230	3.68	4.24	A.
June	7,500	.....	3,500	2.46	2.74	B.
July	.....	.....	1,500	1.06	1.22	C.
August	.....	.....	1,800	1.27	1.46	C.
September	.....	.....	1,500	1.06	1.18	C.
October	.....	.....	1,250	.880	1.01	D.
November	.....	.....	1,000	.704	.79	D.
December	.....	.....	900	.634	.73	D.
The year	.....	.....	2,230	1.57	21.36	

NOTE.—Discharge during ice conditions 1907–8 based on climatological reports, the discharge of adjacent drainages and one measurement made under ice conditions. Discharge April 1 to 25, 1907, 2,300 second-feet.

Discharge during conditions of probable backwater from log jam about June 12 to December 31, 1908 based on the results of one discharge measurement, which indicated that the backwater effect at 7.7 feet was about 0.55 foot. Estimated results for this period subject to considerable error.

MACHIAS RIVER DRAINAGE BASIN.

DESCRIPTION.

Machias River is fairly representative of several of the smaller streams in Maine that discharge their waters into the ocean and are commonly referred to as "coastal rivers." It rises in the Machias Lakes, in the near vicinity of the Grand Lake system of the St. Croix, flows in a generally southeasterly direction to tide water at Machias, a distance of some 50 miles, and its drainage area measures 495 square miles. At East Machias, near the mouth, it is joined by East Machias River, a stream of similar characteristics rising in Pocamoonshine Lake, near Princeton, and draining about 345 square miles.

The Machias drainage basin is considerably broken with hills and low mountains, and attains an altitude in its northwestern portion of about 400 feet above sea level. Near the coast the prevailing rock is quartzite, while farther inland granite is found, and near the headwaters mica schists prevail. The basin is generally forested.

The mean annual rainfall is probably about 42 inches, or a little greater than that of the St. Croix basin, and winter conditions are similar to those of the St. Croix.

In the whole Machias basin there are about 70 square miles of lake surface which are, however, largely near the headwaters. They are utilized to a small extent for log driving.

There are good water-power sites on the Machias and its principal branch, and developments have been made at Machias, East Machias, and Whitneyville. The river is one of promise as regards storage possibilities when conditions warrant development.

A station has been maintained on the Machias River near Whitneyville since 1903. While complete yearly records are not available, 1906 was probably the wettest year during this time and 1905 the driest, the total flow during these two years being about in the ratio of 1 to 1.72.

MACHIAS RIVER AT WHITNEYVILLE, ME.

This station was established October 17, 1903, and was originally located at the bridge of the Washington County Railroad, near Whitneyville, about 8 miles above the mouth of the river. On October 3, 1905, the gage was transferred to the wooden highway bridge, about one-half mile upstream from the railroad bridge. It has been maintained to obtain general statistical data regarding the total flow of the Machias River. A short distance above the station is a storage dam which causes considerable fluctuation in the gage

heights at low-water periods. At the original location backwater from the dam at Machias, about 4 miles below, or from the accumulation of logs, occurred during a considerable portion of the time, and some of the gage heights previous to October 3, 1905, are liable to very considerable errors.

During the winter months the discharge is affected by ice. Conditions for obtaining accurate discharge at the new location are fair, and a fair rating curve has been developed, except at low stages, which are somewhat uncertain.

The discharge has been computed for all years since the establishment of the station. The 1903–4 values as published in Water-Supply Paper No. 124 have been revised on the basis of new and more accurate rating curves. The discharge is materially affected at times during the driving season by log jams.

Discharge measurements of Machias River at Whitneyville, Me., in 1903–1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*[a]	*Feet.*[b]	*Sec.-ft.*
1903.						
October 17	F. E. Pressey	.....	647	6.63	.....	221
1904.						
April 26	F. E. Pressey	.....	1,030	9.67	.....	1,970
April 28	do	.....	1,230	11.19	.....	2,970
May 17	do	.....	1,250	11.64	.....	3,670
May 20	do	.....	1,360	12.41	.....	4,300
Do	do	.....	1,360	12.38	.....	4,170
May 21	do	.....	1,320	12.07	.....	3,800
June 17[c]	N. C. Grover	.....	740	7.54	.....	400
August 22	F. E. Pressey	.....	860	8.54	.....	1,100
August 24	do	.....	730	7.51	.....	540
November 7	do	.....	580	6.40	.....	325
1905.						
May 13	Barrows and Pressey	124	715	7.49	.....	992
June 15[c]	F. E. Pressey	125	1,000	9.57	.....	1,340
September 8	do	125	770	7.88	.....	1,000
October 3	do	124	560	6.18	3.42	210
November 21	do	124	585	6.47	3.88	430
1906.						
April 24	F. E. Pressey	124	1,050	.....	7.01	2,710
May 24	do	126	830	.....	5.49	1,460
August 28	do	125	605	.....	3.45	315
November 8	do	125	650	.....	4.11	535
1907.						
May 10	F. E. Pressey	122	999	.....	6.90	2,510
October 31	do	125	691	7.41	4.52	769
1908.						
March 5[d]	F. E. Pressey	125	733	8.33	5.38	1,010
September 17	do	122	374	.....	3.04	87.6

[a] Gage at railroad bridge.
[b] Gage at highway bridge.
[c] Discharge affected by log jams.
[d] River partly frozen. Average thickness of ice 0.7 foot; gage height to top of ice, 5.38 feet.

Daily gage height, in feet, of Machias River at Whitneyville, Me., for 1907–8.

[Ira S. Albee, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	4.9	4.3	4.3	5.4	8.0	4.9	4.4	3.9	3.25	5.0	4 6	4.8
2	5.9	4.25	4.3	5.5	8.0	4.8	5.1	3.8	3.25	4.7	4.4	4.7
3	5.7	4.3	4.35	5.6	8.3	4.7	5.0	3.7	3.2	4.7	4.5	4.6
4	5.4	4.3	4.35	5.5	8.1	4.6	4.9	3.75	3.2	4.65	4.7	4.5
5	5.5	4.25	4.35	5.6	7.5	5.6	4.8	3.8	3.4	4.5	4.8	4.5
6	5.4	4.25	4.35	5.6	7.3	6.8	4.7	4.1	3.6	4.4	4.9	4.5
7	5.2	4.25	4.4	6.2	7.0	6.9	4.6	4.1	3.65	4.4	7.6	4.4
8	5.1	4.3	4.4	6.0	7.0	7.0	4.5	4.05	3.6	4.6	8.6	4.3
9	5.0	4.3	4.4	5.9	6.9	7.0	4.5	4.0	3.5	6.4	7.6	4.2
10	6.0	4.3	4.4	5.7	6.9	6.9	4.6	4.0	3.4	6.0	7.0	4.2
11	4.5	4.3	4.4	5.5	6.9	6.8	4.55	3.9	3.3	5.6	6.5	4.3
12	4.3	4.25	4.35	5.45	6.8	6.9	4.5	3.8	3.25	5.0	6.2	6.8
13	4.4	4.25	4.35	5.4	6.75	7.0	4.4	3.7	3.2	4.6	5.4	7.0
14	4.3	4.25	4.35	5.4	6.7	6.8	4.3	3.6	3.2	4.4	4.9	6.2
15	4.3	4.3	4.4	5.4	6.8	6.6	4.2	3.5	3.2	4.3	4.9	6.0
16	4.4	4.3	4.4	5.5	6.8	6.3	4.0	3.45	3.2	4.2	4.9	5.9
17	4.5	4.25	4.4	5.6	6.6	6.2	3.9	3.45	3.2	4.1	4.7	5.7
18	4.45	4.25	4.45	5.7	6.4	6.1	3.8	3.4	3.2	4.0	4.5	5.6
19	4.4	4.3	4.45	6.0	6.3	6.0	3.7	3.4	3.2	4.0	4.3	5.5
20	4.45	4.3	4.4	6.4	5.3	5.9	3.6	3.4	3.2	3.9	4.2	5.2
21	4.7	4.3	4.45	6.4	5.3	5.8	3.5	3.35	3.2	3.8	4.1	5.0
22	5.0	4.3	4.5	6.45	5.5	5.7	3.3	3.3	3.25	3.7	4.1	5.0
23	4.8	4.3	4.5	6.5	5.7	5.4	3.3	3.3	3.25	3.6	4.1	5.0
24	4.7	4.35	4.55	7.9	5.5	5.1	3.4	3.25	3.7	3.5	4.15	5.6
25	4.6	4.35	4.6	9.4	5.5	4.1	3.45	3.3	4.2	3.5	4.3	6.8
26	4.6	4.4	4.7	9.1	5.4	4.0	3.5	3.35	4.8	3.5	6.7	6.6
27	4.4	4.4	4.65	8.8	5.3	3.9	3.5	3.4	4.4	3.55	6.8	5.8
28	4.4	4.3	4.6	8.6	5.2	3.8	3.55	3.3	4.0	3.55	6.2	5.4
29	4.3	.....	4.7	8.4	5.25	3.8	3.6	3.25	4.2	3.7	5.6	5.4
30	4.3	.....	5.3	8.1	5.1	4.0	3.7	3.2	4.6	4.5	5.2	5.5
31	4.25	.....	5.4	.....	5.0	.....	4.0	3.2	.....	4.55	.....	6.5
1908.[b]												
1	6.3	5.2	6.6	5.3	7.0	7.0	4.2	3.6	3.9	3.7	5.8	3.8
2	5.7	5.3	6.0	5.1	8.5	7.5	4.1	3.6	3.8	3.8	5.0	3.8
3	5.3	5.4	5.7	5.0	8.0	8.0	4.0	3.7	3.7	4.5	4.3	3.7
4	5.0	5.5	5.5	4.8	7.5	7.6	4.0	3.7	3.6	4.7	4.0	3.6
5	4.9	5.4	5.4	4.9	6.6	7.3	4.0	3.8	3.6	4.5	3.8	3.5
6	4.85	5.3	5.35	5.0	6.0	7.0	4.0	3.8	3.6	4.3	3.6	3.5
7	4.8	5.2	5.3	5.1	5.8	6.5	4.0	3.8	3.6	4.1	3.5	3.5
8	5.6	5.1	5.2	5.1	5.6	6.0	4.05	3.8	3.6	3.9	3.5	5.0
9	6.9	5.1	5.1	5.2	6.0	5.5	3.9	3.9	3.6	3.7	3.5	4.9
10	6.2	5.15	5.15	5.6	6.4	5.0	3.9	3.9	3.6	3.5	3.5	4.8
11	5.7	5.2	5.1	6.0	6.3	4.9	3.9	3.9	3.6	3.4	3.5	4.7
12	5.3	5.2	5.1	6.1	6.1	4.9	3.9	3.95	3.6	3.4	3.5	4.6
13	5.6	5.25	5.1	6.1	6.0	5.0	3.9	3.95	3.5	3.4	3.5	4.5
14	6.0	5.3	5.1	5.9	5.9	5.0	3.85	4.0	3.45	3.4	3.5	4.5
15	6.0	5.4	5.6	5.7	5.7	5.2	3.85	4.0	3.4	3.4	3.5	4.4
16	6.0	8.0	8.0	5.8	5.5	5.4	3.85	4.0	3.3	3.4	4.3	4.3
17	5.9	8.7	8.2	6.0	5.3	5.6	3.7	4.0	3.0	3.4	4.4	4.2
18	5.2	7.7	7.8	6.0	5.2	5.8	3.7	4.0	3.0	3.4	4.3	4.1
19	5.1	6.7	7.0	6.2	5.3	6.0	3.7	3.9	3.0	3.4	4.2	4.0
20	5.0	6.3	6.4	6.4	5.4	5.5	3.7	3.8	3.1	3.4	4.0	3.9
21	4.9	5.7	5.6	6.4	5.5	5.3	3.7	3.7	3.2	3.35	3.9	3.8
22	4.8	5.4	5.3	6.5	5.4	5.2	3.7	3.6	3.3	3.35	3.8	3.7
23	4.4	5.2	5.3	6.5	5.3	5.0	3.7	3.5	3.4	3.35	3.7	3.6
24	4.3	5.0	6.3	6.5	5.3	4.8	3.7	3.6	3.45	3.3	3.6	3.5
25	4.2	5.0	7.5	6.6	5.35	4.7	3.6	3.7	3.5	3.4	3.6	3.5
26	4.2	5.0	6.7	6.5	5.4	4.6	3.6	3.8	3.5	3.5	3.6	3.5
27	4.4	5.2	6.0	6.6	5.5	4.5	3.6	3.9	3.5	3.6	3.7	3.5
28	4.5	6.0	6.2	6.6	6.5	4.4	3.6	4.0	3.6	4.0	3.8	3.5
29	4.55	7.2	6.0	7.0	6.6	4.3	3.6	4.0	3.65	4.8	3.9	3.5
30	4.7	.....	5.8	6.9	6.6	4.2	3.6	4.0	3.7	5.2	3.8	3.5
31	5.0	.....	5.6	.....	6.6	.....	3.6	4.0	.....	5.5	.....	3.5

[a] The extent of the effect of ice conditions on the discharge for 1907 is doubtful. It appears probable, however, that this effect was continuous from about January 10 to about March 25. There may also have been backwater from ice conditions the last of March and the first three weeks of April. December, 1907, was probably unaffected.

[b] The extent of the effect of ice conditions on the discharge for 1908 is doubtful. It is probable, however, that this effect occurred approximately as follows: January 15 to February 15, February 21 to March 15, and December 13 to 31.

Rating tables for Machias River at Whitneyville, Me.

OCTOBER 17, 1903, TO SEPTEMBER 10, 1904.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
5.20	10	6.70	246	8.20	890	10.40	2,460
5.30	16	6.80	275	8.30	945	10.60	2,630
5.40	23	6.90	306	8.40	1,000	10.80	2,800
5.50	31	7.00	339	8.50	1,060	11.00	2,980
5.60	40	7.10	374	8.60	1,120	11.20	3,160
5.70	50	7.20	411	8.70	1,185	11.40	3,340
5.80	62	7.30	450	8.80	1,250	11.60	3,520
5.90	75	7.40	491	8.90	1,315	11.80	3,710
6.00	90	7.50	535	9.00	1,380	12.00	3,900
6.10	107	7.60	581	9.20	1,520	13.00	4,860
6.20	126	7.70	629	9.40	1,660	14.00	5,860
6.30	147	7.80	678	9.60	1,810	15.00	6,910
6.40	170	7.90	728	9.80	1,970	16.00	8,010
6.50	194	8.00	780	10.00	2,130		
6.60	219	8.10	835	10.20	2,290		

NOTE.—This table supersedes the rating table used in Water Supply Paper 124. The date of change from this table to the following one is somewhat uncertain.

The table is not applicable for ice or obstructed-channel conditions. It is based on 9 discharge measurements made during 1903–4 and is well defined between gage heights 6.6 feet and 13 feet. Below 6 feet the rating is very uncertain.

SEPTEMBER 11, 1904, TO SEPTEMBER 30, 1905.

5.00	25	6.20	280	7.40	770	9.20	1,900
5.10	35	6.30	315	7.50	820	9.40	2,060
5.20	50	6.40	350	7.60	875	9.60	2,220
5.30	65	6.50	385	7.70	930	9.80	2,380
5.40	80	6.60	420	7.80	985	10.00	2,540
5.50	100	6.70	460	7.90	1,040	10.20	2,700
5.60	120	6.80	500	8.00	1,100	10.40	2,860
5.70	140	6.90	540	8.20	1,220	10.60	3,040
5.80	165	7.00	580	8.40	1,350	10.80	3,220
5.90	190	7.10	625	8.60	1,480	11.00	3,400
6.00	220	7.20	670	8.80	1,620	12.00	4,320
6.10	250	7.30	720	9.00	1,760		

NOTE.—This table is not applicable for ice or obstructed-channel conditions. It is based on 4 discharge measurements made during 1905 and 1 made during 1904 and the 1906–1908 rating curve. The 1906–1908 rating was utilized by means of a relation established between the new and old gages from simultaneous gage heights October to December, 1905. It is fairly well defined between gage heights 6 feet and 12 feet. Below 6 feet the rating is very uncertain.

OCTOBER 1, 1905, TO DECEMBER 31, 1908.

2.50	10	3.80	382	5.10	1,140	6.80	2,470
2.60	17	3.90	431	5.20	1,210	7.00	2,650
2.70	27	4.00	482	5.30	1,280	7.20	2,830
2.80	40	4.10	534	5.40	1,350	7.40	3,010
2.90	56	4.20	587	5.50	1,420	7.60	3,190
3.00	77	4.30	642	5.60	1,490	7.80	3,380
3.10	105	4.40	698	5.70	1,560	8.00	3,580
3.20	138	4.50	755	5.80	1,640	8.20	3,780
3.30	174	4.60	814	5.90	1,720	8.40	3,980
3.40	211	4.70	875	6.00	1,800	8.60	4,180
3.50	250	4.80	937	6.20	1,960	8.80	4,380
3.60	292	4.90	1,000	6.40	2,120	9.00	4,580
3.70	336	5.00	1,070	6.60	2,290	10.00	5,680

NOTE.—This table is not applicable for ice or obstructed-channel conditions. It is based on 8 discharge measurements made during 1905 to 1908 and is well defined between gage heights 3 feet and 7 feet. Below gage height 3 feet the rating is very uncertain.

Monthly discharge of Machias River at Whitneyville, Me., for 1903–1908.

[Drainage area, 465 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1903.[a]						
October 17–31	1,060	219	528	1.14	0.64	A.
November	1,180	306	644	1.38	1.54	A.
December	1,220	430	697	1.50	1.73	C.
1904.[a]						
March 22–31	2,980	835	1,830	3.94	1.47	A.
April	5,860	1,520	2,680	5.76	6.43	A.
May	7,570	728	2,980	6.41	7.39	A.
June	2,380	275	800	1.72	1.92	C.
July	678	50	303	.652	.75	C.
August	1,120	10	172	.370	.43	C.
September	3,220	25	562	1.21	1.35	D.
October	1,980	250	669	1.44	1.66	D.
November	770	220	424	.912	1.02	C.
December 1–8	350	80	216	.465	.14	D.
1905.[b]						
April	4,230	1,350	2,240	4.82	5.38	C.
May	2,060	350	1,000	2.15	2.48	C.
June	1,420	820	1,080	2.32	2.59	D.
July	1,900	350	712	1.53	1.76	C.
August	670	80	279	.600	.69	C.
September	1,280	50	488	1.05	1.17	C.
October	292	40	148	.318	.37	B.
November	968	56	527	1.13	1.26	A.
1906.[b]						
April	5,460	814	2,370	5.10	5.69	B.
May	5,130	1,350	2,560	5.51	6.35	A.
June	3,380	937	1,910	4.11	4.59	A.
July	2,740	431	1,010	2.17	2.50	A.
August	755	138	323	.695	.80	B.
September	431	77	161	.346	.39	B.
October	814	10	299	.643	.74	B.
November	1,720	336	852	1.83	2.04	A.
December	1,800	382	718	1.54	1.78	B.
1907.[c]						
January	1,720	.....	759	1.63	1.88	C.
February	.....	.....	400	.860	.90	D.
March	.....	.....	550	1.18	1.36	D.
April	5,020	1,350	2,230	4.80	5.36	B.
May	3,800	1,070	2,190	4.71	5.43	A.
June	2,650	382	1,610	3.46	3.86	A.
July	1,140	174	554	1.19	1.37	A.
August	534	138	293	.630	.73	A.
September	937	138	283	.609	.68	A.
October	2,120	250	708	1.52	1.75	A.
November	4,180	534	1,400	3.01	3.36	A.
December	2,650	587	1,350	2.90	3.34	A.
The year	5,020	138	1,030	2.21	30.02	

[a] The values for 1903–4 supersede those published in Water Supply Paper 124. Discharge December 1903, assumed unaffected by ice. Discharge January 1 to March 21 and December 9 to 31, 1904, affected by ice conditions. Log jam at station June 17, 1904, affected the discharge 28 per cent. On the basis of this the mean discharge for June was reduced 18 per cent. Maximum and minimum assumed unaffected.

[b] Ice conditions prevailed approximately as follows during 1905 and 1906: January 1 to March 30 and December 1 to 31, 1905; January 1 to March 31, 1906. It is possible also that April 1 to April 14 and December, 1906, were slightly affected. Discharge affected by log jams April 1 to 17 and June 1 to 23, 1905. Approximate corrections were applied to April and June, based on observer's notes and one discharge measurement and comparison with adjacent streams.

	Second-feet.
Discharge April 1 to 17, 1905	2,590
June 1 to 23, 1905	1,100

[c] See footnote at end of table, next page.

Monthly discharge of Machias River at Whitneyville, Me., for 1903-1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.[a]						
January	2,560	.....	1,190	2.56	2.95	C.
February	4,280	.....	1,380	2.97	3.20	D.
March	3,780	.....	1,660	3.57	4.12	C.
April	2,650	937	1,750	3.76	4.20	A.
May	4,080	1,210	1,890	4.06	4.68	A.
June	3,580	587	1,550	3.33	3.72	A.
July	587	292	392	.843	.97	A.
August	482	250	402	.865	1.00	A
September	431	77	247	.531	.59	A.
October	1,420	174	418	.899	1.04	A.
November	1,640	250	446	.959	1.07	A.
December	1,070	.....	374	.804	.93	D.
The year	4,280	77	975	2.10	28.47	

[a] Discharge during ice conditions, 1907-8, based on climatological reports, discharge at other stations in Maine, and on one measurement made under ice conditions.

	Second-feet.
Discharge January 10, 1907	800
January 13 to 31, 1907	500
January 16 to 31, 1908	880
February 1 to 15, 1908	950
February 21 to 29, 1908	1,150
March 1 to 15, 1908	1,040
December 13 to 31, 1908	250

PENOBSCOT RIVER DRAINAGE BASIN.

DESCRIPTION.

The West or principal branch of Penobscot River rises in the mountainous region of Maine near the Canadian boundary, and it flows in a general southeasterly direction to its junction with the East Branch of the river at Medway, a distance of over 100 miles. From the mouth of the East Branch to tidewater at Bangor is about 75 miles, this latter point being 27 miles from the mouth of the river at Penobscot Bay. The total length of the river is, therefore, about 200 miles. The drainage basin has an extreme breadth of about 115 miles and comprises 8,500 square miles, or more than one-fourth the entire State.

The important tributaries of the Penobscot in the order of their confluence from the source of the river are as follows:

Tributaries of Penobscot River.

River.	Enters Penobscot at—	Drainage area (square miles).
East Branch Penobscot River	Medway	1,130
Mattawamkeag River	Mattawamkeag	1,500
Piscataquis River	Howland	1,500

The basin lies in general at a somewhat lower elevation than that of Kennebec River, for the latter is nearer to the summit mountain range on the western boundary of the State. As a whole, it is rather uniform in its topographic features, hills and low mountains stretching from the region near the sea to a point above Bangor. Farther north its surface is an undulating plain, while westward it becomes more broken and generally diversified by hills, detached peaks, lakes, ponds, and swamps. The headwaters of the Kennebec, Penobscot, and St. John are all in the same vicinity, a highland region intermingled with swamps and lagoons. Mount Katahdin, the highest peak of which is 5,273 feet above mean tide, and the highest mountain in the State, lies in a detached range of mountains between the West and East branches of the Penobscot.

The predominant rocks of the Penobscot basin are shales, slates, and schists. In the Mount Katahdin region and near the mouth of the river granite also occurs in considerable areas. The character of the river valley is determined largely by the prevailing rocks. Thus, for many miles above Bangor the river flows through an area where the rocks are relatively soft shales, slates, and schists, and its valley here is broad. Between Hampden and Bucksport, however, where harder granites and schists are found, the valley is narrow with steep walls, and a short distance below Ripogenus Lake some of the finest river scenery in the country is found.

Chesuncook Lake lies near the center of the basin at an elevation of 930 feet above sea level. From this point to tide water the distance along the river is 126 miles, or an average fall of 7.4 feet per mile.

Nearly two-thirds of the Penobscot River basin consists of timber land. Spruce prevails, although white pine, cedar, and white birch are also produced in considerable quantities.

The mean annual precipitation varies from about 43 inches near the coast to less than 35 inches in the northern portions, the mean for the whole basin being about 39 inches, slightly less than that of the Kennebec.

The river freezes over during the winter and large accumulations of snow occur.

The natural storage facilities of the Penobscot, with its total lake and pond surface of approximately 550 square miles, are surpassed only by those of the Kennebec and Androscoggin basins. On the West branch some 30 billion cubic feet of storage in the Twin and Chesuncook Lake systems is utilized in connection with the developments of the Great Northern Paper Company, at and near Millinocket, with marked effect upon the regimen of flow. On the East Branch Chamberlain and Allegash Lakes and a number of others are capable

of storing much of the flow. Mattawamkeag and Piscataquis rivers all have good storage possibilties, and it is safe to say that 80 or 90 billion cubic feet of water could economically be stored in the various portions of the Penobscot basin. While storage on the West Branch of the river is very efficiently controlled by the Great Northern Paper Company, in all other localities use of the stored water is made merely for log driving, and a systematic regulation of stored flow would be of great benefit to present and future users of power.

Log driving is an important industry on the Penobscot, and the annual drive amounts to over 200 million feet b. m. The river is navigable to Bangor except during the winter months.

Considerable power has been developed on the Penobscot, notably for the pulp and paper mills at Oldtown, West Enfield, and Millinocket, but there is a very large amount of undeveloped power both on the main river and its principal tributaries.

The longest run-off record in the Penobscot basin is that at Millinocket, beginning in 1901. The driest year at that point since 1900 was 1904, and the wettest was 1902, the total flow during these two years being in the ratio of 1 to 2.08. Storage on the West Branch has very materially changed the regimen of flow since 1901. The driest year at West Enfield was 1905, and the wettest was 1907, the ratio being 1 to 1.78.

The following gaging stations have been maintained in the Penobscot basin:

Penobscot River at Millinocket (1901–1908).
Penobscot River at West Enfield (1901–1908).
Penobscot River at Sunk Haze Rips, near Costigan (1899–1900).
East Branch Penobscot River at Grindstone (1902–1908).
Mattawamkeag River at Mattawamkeag (1902–1908).
Piscataquis River near Foxcroft (1902–1908).
Cold Stream at Enfield (1904–1906).
Kenduskeag Stream near Bangor (1908).
Phillips Lake Outlets at Holden (1904–1908).

RIVER SURVEYS IN PENOBSCOT DRAINAGE BASIN.

Surveys have been made in the Penobscot River drainage basin by the United States Geological Survey as follows:

Penobscot River, from tide water to Seeboomook Falls, near Northwest Carry; East Branch Penobscot River, from Grand Lake to mouth; Mattawamkeag River, from North Bancroft to mouth.

Allegash, Chamberlain, Telos, Webster, Second, and Grand lakes in East Branch Penobscot drainage basin.

Mattawamkeag and Baskahegan lakes and Pleasant Pond in Mattawamkeag drainage basin.

Schoodic, Seboois and Endless lakes in Piscataquis drainage basin.

From the data collected by the river surveys sheets have been prepared showing as far as available the profile of water surface, plan of the river, contours along the banks, and prominent natural or artificial features.

From the lake surveys sheets have been prepared showing as far as possible the shore lines and bank contours covering any probable increase in storage capacity.

The results of these surveys have been in part published on sheets, which may be had on application to the Director of the Geological Survey.

WEST BRANCH OF PENOBSCOT RIVER AT MILLINOCKET, ME.

The discharge of Penobscot River at the Millinocket mill of the Great Northern Paper Company has been computed and the data furnished since 1901 by H. S. Ferguson, engineer for the company. The development at Millinocket was made by placing a concrete dam on the Penobscot at the outlet of Quakish Lake, a little over a mile from the mill site on Millinocket Stream, which enters the Penobscot about 4½ miles below Quakish Lake. Millinocket Stream has only a slight fall, while the main river drops some 112 feet in this vicinity, and by utilizing the former for a tailrace a head of about 110 feet has been obtained.

About 3 miles above Quakish Lake dam is North Twin Lake dam—a comparatively new storage dam affording about 14.5 billion cubic feet of storage.

Records are obtained by considering the flow through the wheels, the flow over the dam, and water used from time to time by the log sluice, filters, etc. The wheels were rated at Holyoke, Mass., before being placed in position. As the head under which they work, averaging about 110 feet, is much greater than the head under which they were tested, numerous tube-float measurements of flow in the canal leading to the mill have been made by Mr. Ferguson, in order to determine just how much water the mill used under different conditions of gate openings. In addition to this, during 1904 a series of current-meter measurements were made by the United States Geological Survey to check results as obtained by the floats and to obtain a suitable coefficient for use with the float measurements. It is believed that by means of these various checks on the measurements a very good estimate has been made of the flow through the wheels.

An automatic recording gage of the Frieze type is installed at Quakish Lake dam and flow is computed by the formula $Q = cbh^{\frac{3}{2}}$, in which c is a variable coefficient obtained (1) from the results of

weir measurements made by Mr. Ferguson on a 10-foot portion of the dam, and (2) from a study of the results of experiments made by George W. Rafter at the Cornell testing flume.

When the flow of the river is less than 2,500 second-feet all the water is generally used through the mill; flow over the flashboards, which are used much of the time, is computed by use of the formula $Q=3.33\ bh^{\frac{3}{2}}$. Quakish Lake dam is at an elevation of 456.3 feet above mean sea level, as determined by the Penobscot River survey of 1904.

Several storage dams, including the North Twin dam previously mentioned, which have been constructed at points in the basin above this mill, store water on a surface of about 65 square miles, with a capacity of about 30 billion cubic feet. Except during the time (usually in August) that excess water has to be supplied for log driving on the river below Millinocket and for a short time in the spring the run-off is regulated by storage. Further storage capacity, sufficient to practically control the run-off from the drainage area above Millinocket, is contemplated by the Great Northern Paper Company. Millinocket Lake is now being used for power storage at the new mills of the company at East Millinocket and Dolby. It has been utilized for log driving for many years in the past.

The records of discharge at Millinocket are under the personal supervision of Mr. Ferguson, are carefully kept, and are rated as excellent. No difficulty is experienced in winter on account of ice affecting the estimates of discharge or the running of the wheels. Ferguson Pond, just above the entrance to the canal, eliminates effect from anchor ice.

The maximum daily discharge since the beginning of the records occurred April 1 and 2, 1903, and was a flow of 24,250 second-feet. The minimum weekly discharge at this point, not considering periods when water was not in use at the mill, was 291 second-feet, occurring January 28 to February 3, 1904.

The Millinocket mill of the Great Northern Paper Company, with nearly 25,000 horsepower of wheel installation, has a daily output of about 300 tons of pulp and 300 tons of paper, and is doubtless the largest mill in the world. At East Millinocket and Dolby, about 10 miles down river, are other mills of this company, constructed during 1907, and utilizing over 15,000 horsepower of wheels, with a daily capacity of about 180 tons of pulp and 130 tons of paper. This is, therefore, an important district in the manufacture of pulp and paper.

Daily discharge in second-feet of West Branch of Penobscot River at Millinocket, Me., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2,067	2,018	849	324	2,507	13,220	6,923	2,900	a2,014	2,160	2,179	a7,940
2	2,064	2,033	812	451	2,519	a10,573	7,076	3,825	2,008	2,149	2,171	7,655
3	2,068	(a b)	a475	657	2,523	8,443	7,323	3,555	2,243	2,154	(b)	6,300
4	2,068	2,000	804	644	2,740	7,787	6,102	(b)	2,197	2,154	3,088	5,591
5	2,066	2,000	807	1,028	a3,486	7,616	6,146	4,300	2,198	2,164	2,880	4,669
6	(a b)	2,008	488	1,228	4,470	9,916	6,964	5,696	2,182	a2,001	3,370	3,450
7	2,075	2,005	328	a682	4,718	8,567	a6,425	5,476	2,181	2,011	2,917	2,680
8	2,066	2,014	328	1,124	4,713	7,763	6,264	5,143	a2,000	2,185	3,682	a2,600
9	2,070	2,006	326	1,241	5,110	a7,393	6,852	5,031	2,114	2,173	6,641	2,605
10	2,067	(a b)	a202	960	4,378	7,986	6,210	4,618	2,192	2,179	a7,318	3,400
11	2,055	2,007	337	824	4,685	6,077	4,868	a4,119	2,186	2,190	7,787	2,750
12	2,049	2,000	324	1,096	a4,459	5,705	2,853	3,914	2,180	2,185	8,671	4,927
13	(a b)	2,007	328	1,258	4,184	5,699	4,260	3,465	2,157	(a b)	8,454	4,824
14	2,002	1,741	333	a747	4,819	5,915	a6,408	3,060	2,182	2,000	8,434	2,850
15	2,000	1,235	320	1,497	5,563	6,131	6,401	3,015	a2,027	2,155	8,508	a3,350
16	2,000	1,252	333	1,674	7,727	a5,907	7,225	3,191	2,043	2,165	8,518	5,150
17	(b)	a1,008	a290	1,668	6,840	6,280	6,895	3,750	2,165	2,164	a8,373	5,000
18	(b)	1,241	337	1,659	7,778	6,173	6,756	a3,755	2,170	2,171	9,006	5,076
19	2,052	1,241	277	1,656	a7,732	6,273	5,674	3,389	2,165	2,175	9,066	5,076
20	(a b)	1,231	314	1,661	7,355	6,374	4,559	3,138	2,164	a3,061	9,057	5,020
21	2,000	1,244	325	a832	7,801	4,704	a4,936	3,225	2,165	7,726	9,057	5,020
22	2,000	1,252	321	1,847	7,376	5,607	4,521	3,205	a2,000	8,113	9,630	a4,954
23	2,000	1,255	316	2,420	7,528	a2,743	4,458	2,855	2,082	4,755	8,796	4,963
24	2,000	a753	a193	2,518	7,943	3,205	4,406	2,800	2,170	2,172	a8,886	4,934
25	2,000	968	317	2,523	8,486	6,861	4,607	a2,107	2,175	2,162	9,201	4,963
26	2,002	819	323	2,450	a12,208	6,815	3,939	3,233	2,259	2,174	8,976	4,852
27	(a b)	825	318	2,435	14,255	6,955	2,575	2,610	2,222	(a b)	9,018	4,810
28	2,018	968	320	(a b)	12,952	6,943	a2,210	2,620	2,173	(b)	9,000	4,751
29	2,023	.....	319	2,340	13,163	7,307	2,433	2,110	a2,000	2,218	8,415	a2,492
30	2,029	.....	317	2,331	13,671	a6,824	2,575	2,110	2,105	2,537	8,068	2,616
31	2,019	.....	a197	.....	15,205	.....	2,575	2,160	.....	2,447	.....	4,686
1908.												
1	3,570	3,115	a2,803	3,130	2,680	10,533	4,015	5,172	2,150	.....	.....	.....
2	3,545	a1,650	3,049	3,105	2,550	12,498	2,945	a5,070	2,175	.....	.....	.....
3	3,400	2,341	2,925	2,997	a2,376	12,864	2,870	2,489	2,155	.....	.....	.....
4	3,435	3,030	2,244	2,753	2,431	12,326	3,350	2,117	2,178	.....	.....	.....
5	a2,482	3,108	2,517	a2,556	2,923	10,329	a3,387	2,179	2,175	.....	.....	.....
6	3,144	3,104	3,164	3,212	3,049	9,626	3,781	2,325	a2,165	.....	.....	.....
7	3,160	3,093	3,157	3,692	2,545	a9,237	3,475	2,619	1,991	.....	.....	.....
8	3,455	3,119	a2,685	3,778	2,575	8,926	2,935	2,305	2,067	.....	.....	.....
9	3,367	a1,660	2,899	3,689	2,593	9,193	3,950	a2,250	2,205	.....	.....	.....
10	3,474	2,346	3,111	3,497	a10,835	9,326	5,005	1,857	2,200	.....	.....	.....
11	3,427	3,052	3,169	3,421	14,928	9,481	3,917	2,095	2,025	.....	.....	.....
12	a2,878	3,042	3,160	a3,158	17,370	9,462	a3,605	2,140	2,143	.....	.....	.....
13	3,231	3,081	3,135	3,470	17,393	8,724	3,430	2,387	a2,077	.....	.....	.....
14	3,449	2,945	3,126	3,551	17,396	a7,030	3,994	2,085	2,102	.....	.....	.....
15	3,519	2,949	a2,686	3,363	17,587	5,890	3,975	2,193	2,048	.....	.....	.....
16	3,524	a2,505	2,965	2,649	18,705	4,061	4,065	a2,425	2,081	.....	.....	.....
17	3,487	2,722	3,129	2,595	a18,350	4,640	4,767	2,370	1,623	.....	.....	.....
18	3,408	2,937	3,096	2,550	16,831	4,510	4,721	2,312	1,590	.....	.....	.....
19	a2,772	2,934	3,167	a2,190	16,253	4,490	a5,060	2,362	1,659	.....	.....	.....
20	2,437	2,961	3,184	2,577	16,299	4,505	4,334	2,365	a1,940	.....	.....	.....
21	3,072	3,101	3,060	2,686	14,757	a4,331	4,651	2,425	1,930	.....	.....	.....
22	3,117	3,146	a2,851	2,869	13,501	3,600	3,120	2,430	1,945	.....	.....	.....
23	3,147	a2,635	2,954	2,581	13,002	4,841	3,072	a2,490	1,945	.....	.....	.....
24	3,094	2,852	3,135	2,421	a12,794	4,449	2,485	2,310	2,015	.....	.....	.....
25	3,034	3,098	3,096	2,443	8,840	2,885	2,610	2,568	1,935	.....	.....	.....
26	a1,600	3,102	3,106	a2,201	6,472	3,170	a2,632	2,508	1,975	.....	.....	.....
27	2,395	3,103	3,151	2,712	8,516	3,123	2,955	2,535	a1,925	.....	.....	.....
28	3,039	3,117	3,147	2,821	8,434	a3,482	4,078	2,678	1,945	.....	.....	.....
29	3,112	3,195	a2,683	2,621	7,476	5,228	4,370	2,232	1,755	.....	.....	.....
30	3,126	.....	2,938	2,619	7,272	4,498	4,873	a2,145	1,912	.....	.....	.....
31	3,120	.....	3,125	.....	a8,223	.....	5,100	1,753	.....	.....	.....	.....

a Sunday. b Records incomplete.

NOTE.—Owing to incompleteness of records on missing days during 1907–8 the discharge could not be computed.

Monthly discharge of West Branch of Penobscot River at Millinocket, Me., for 1907-8.

[Drainage area, 1,880 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.[a]					
January (25 days)	2,080	2,000	2,030	1.08	1.24
February (26 days)	2,030	753	1,510	.803	.84
March	849	193	380	.202	.23
April (29 days)	2,520	324	1,440	.766	.85
May	15,200	2,510	7,060	3.76	4.34
June	13,200	2,740	6,930	3.69	4.12
July	7,320	2,210	5,210	2.77	3.19
August (30 days)	5,700	2,110	3,480	1.85	2.13
September	2,260	2,000	2,140	1.14	1.27
October (28 days)	8,110	2,000	2,710	1.44	1.66
November (29 days)	9,200	2,170	7,190	3.83	4.27
December	7,940	2,490	4,510	2.40	2.77
The year	15,200	193	3,720	1.98	26.91
1908.[b]					
January	3,570	1,600	3,130	1.66	1.91
February	3,200	1,650	2,860	1.52	1.64
March	3,180	2,240	2,990	1.59	1.83
April	3,780	2,190	2,930	1.56	1.74
May	18,700	2,380	10,200	5.43	6.26
June	12,900	2,880	6,910	3.68	4.11
July	5,100	2,480	3,790	2.02	2.33
August	5,170	1,750	2,490	1.32	1.52
September	2,200	1,590	2,000	1.06	1.18
October	.....	.....	2,000	1.06	1.22
November	.....	.....	2,000	1.06	1.18
December	.....	.....	2,000	1.06	1.22
The year	18,700	.....	3,610	1.92	26.14

[a] For purposes of comparison with other stations the annual discharge for 1907 has been computed on the assumption that no difference exists between the mean discharge for partial months as given above and the true mean discharge for the same months with full number of days.

The mean discharge for the partial months as given above is in most cases in excess of the actual discharge for the full month, owing to storage of water during the days when the records were incomplete. The annual discharge is probably about 1 or 2 per cent in excess from this cause.

[b] Owing to inaccurate records the discharge is only approximate during October, November, and December, 1908.

PENOBSCOT RIVER AT WEST ENFIELD, ME.

This station, which has been maintained to obtain data regarding the total flow of the Penobscot, was established November 5, 1901, and prior to 1904 was designated as being at Montague, Me. In 1904 the name of this village was changed to West Enfield. It is located at the steel highway bridge about 1,000 feet below the mouth of Piscataquis River. There is a dam on Piscataquis River near its entrance into the Penobscot, and about a mile above the station is the dam of the International Paper Company, on the main river. During low water considerable daily fluctuations in gage height occur, due to the variations in wheel gate openings at the mills above.

The datum of the gage has remained the same during the maintenance of the station. During the winter months the discharge is affected by ice. Conditions for obtaining accurate discharge data are good, and a fairly good rating curve has been developed.

The regimen of flow of Penobscot River has been considerably affected by storage, principally in the lakes tributary to the West Branch, since about 1900.

Discharge measurements of Penobscot River at West Enfield, Me., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
September 25	University of Maine students under direction of Prof. H. S. Boardman.	850	4,540	4.60	9,610
Do	do	850	4,570	4.60	9,330
September 28	do	845	3,950	4.25	8,360
October 3	do	835	4,100	4.00	7,020
Do	do	835	3,890	4.00	7,490
October 5	do	850	4,750	4.85	10,100
Do	do	850	4,620	4.85	9,910
October 11	do	865	6,500	6.55	17,000
Do	do	865	6,310	6.55	16,900
October 21	do	800	3,690	3.50	7,040
1908.					
September 26	do	650	2,330	2.20	3,360
Do	do	650	2,510	2.20	3,530
September 30	do	591	1,990	1.52	2,320
Do	do	591	1,880	1.52	2,080
Do	do	591	1,970	1.52	2,090
October 3	do	660	2,470	2.30	3,730
Do	do	660	2,490	2.30	3,580
Do	do	660	2,430	2.30	3,590
October 7	do	675	2,550	2.50	3,970
Do	do	675	2,530	2.50	3,960
Do	do	675	2,640	2.50	3,990
October 15	do	660	2,450	2.30	3,650
Do	do	660	2,520	2.30	3,760
Do	do	660	2,530	2.30	3,540
October 21	do	645	2,370	2.14	3,270
Do	do	645	2,330	2.14	3,230
November 3	do	788	3,100	2.96	5,380
Do	do	795	3,300	2.99	5,370

Daily gage height, in feet, of Penobscot River at West Enfield, Me., for 1907-8.

[A. H. Hanson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	6.9	16.6	8.55	8.9	5.7	3.45	4.2	6.1	6.55
2	.....	.....	.....	7.2	17.1	8.35	9.3	5.85	3.3	4.1	5.9	6.3
3	.....	.....	.....	7.05	16.25	8.0	9.45	6.1	3.4	4.1	6.65	6.1
4	.....	.....	.....	7.05	14.65	7.75	8.85	5.6	3.55	4.4	7.35	6.1
5	.....	.....	.....	7.25	13.85	7.55	8.45	5.35	4.05	4.65	7.45	5.9
6	.....	.....	.....	7.55	12.95	7.6	8.45	6.15	5.15	4.4	7.0	5.35
7	.....	.....	.....	8.0	12.15	8.75	7.65	7.0	5.35	4.25	7.45	4.45
8	.....	.....	.....	8.2	11.7	8.55	7.2	7.1	4.9	4.45	11.2	4.25
9	.....	.....	.....	8.25	11.35	8.45	7.1	6.6	4.5	6.65	10.95	4.1
10	.....	.....	.....	8.15	10.85	8.6	7.05	5.85	4.35	7.0	10.2	4.7
11	.....	.....	.....	7.75	10.0	8.2	6.85	5.4	3.95	6.45	9.8	8.35
12	.....	.....	.....	7.6	9.45	7.5	6.55	5.1	4.05	5.65	9.4	10.6
13	.....	.....	.....	7.5	9.1	6.9	6.35	5.05	4.25	5.3	9.1	9.45
14	.....	.....	.....	7.65	8.85	6.5	6.2	4.95	4.0	5.2	8.75	8.25
15	.....	.....	.....	7.85	8.7	6.25	6.15	4.8	3.75	5.1	8.5	7.25
16	.....	.....	.....	8.3	8.8	6.05	6.45	4.7	3.6	5.1	8.1	7.6
17	.....	.....	.....	8.5	8.75	5.9	6.45	4.65	3.5	4.95	7.75	7.7
18	.....	.....	.....	8.0	9.25	5.95	5.9	4.6	3.5	4.65	7.45	7.65
19	.....	.....	.....	8.1	9.75	5.85	5.45	4.55	3.4	4.1	7.25	7.35
20	.....	.....	.....	8.05	10.15	5.7	5.15	4.5	3.3	3.7	7.1	6.5
21	.....	.....	.....	8.3	9.65	5.6	5.15	4.4	3.45	3.5	7.0	5.9
22	.....	.....	.....	8.3	9.15	5.35	5.5	4.2	3.25	3.45	6.85	5.65
23	.....	.....	.....	8.55	8.65	4.9	5.4	3.95	3.15	3.75	6.75	5.35
24	.....	.....	.....	10.15	8.35	5.05	5.5	4.3	3.55	3.65	6.7	6.55
25	.....	.....	.....	12.25	8.35	5.85	5.55	4.05	4.45	3.9	6.55	6.7
26	.....	.....	.....	12.9	8.05	6.8	5.9	3.95	4.8	3.95	6.75	6.85
27	.....	.....	.....	13.3	7.85	7.25	6.35	4.0	4.7	4.15	6.9	6.9
28	.....	.....	.....	13.7	8.5	9.25	6.5	3.9	4.25	4.25	6.9	6.55
29	.....	.....	.....	15.05	8.85	9.35	6.15	3.8	3.85	4.35	6.8	5.75
30	.....	.....	6.2	15.75	9.15	9.15	5.85	3.75	3.95	6.6	6.7	5.45
31	.....	.....	.....	.....	8.8	.....	5.8	3.65	.....	6.8	.....	5.1
1908.												
1	6.1	.....	.....	8.4	13.15	9.75	4.4	3.85	3.25	1.5	2.78	2.85
2	6.1	.....	.....	8.1	14.4	10.95	4.25	3.7	3.25	2.15	2.66	2.96
3	5.85	.....	.....	7.55	14.0	10.5	3.7	3.3	3.35	2.3	2.72	2.64
4	5.65	.....	.....	7.8	13.45	10.2	3.4	3.05	3.35	2.45	2.66	2.90
5	5.45	.....	.....	7.4	12.5	9.6	3.15	2.8	3.35	2.6	2.76	.....
6	5.2	.....	.....	6.7	12.0	8.65	3.35	2.85	3.45	2.6	2.70	.....
7	4.85	.....	.....	6.4	11.25	8.2	3.5	3.4	3.25	2.5	2.55	3.1
8	4.7	.....	.....	6.4	10.6	7.75	3.65	3.5	3.0	2.4	2.40	.....
9	4.75	.....	.....	6.5	10.3	7.4	4.2	3.4	3.0	2.3	2.11	.....
10	5.4	.....	.....	6.4	11.0	7.2	4.6	3.35	2.9	2.2	2.14	.....
11	5.15	.....	.....	6.5	11.6	7.05	4.3	3.25	2.75	2.1	2.46	.....
12	4.85	.....	.....	6.4	11.8	6.85	4.15	3.15	2.6	2.2	2.51	.....
13	4.55	.....	.....	6.5	12.2	6.45	4.0	3.05	2.7	2.2	2.56	.....
14	4.5	.....	.....	6.5	11.75	5.8	4.25	2.95	2.75	2.3	2.57	3.3
15	4.95	.....	.....	6.5	11.2	5.65	4.0	3.25	2.75	2.2	2.62	.....
16	5.25	.....	.....	6.7	10.8	5.5	4.35	3.45	2.85	2.3	2.37	3.9
17	5.5	.....	.....	7.0	10.8	5.45	4.45	3.7	2.7	2.3	2.45	3.8
18	5.85	.....	.....	6.9	10.9	5.4	4.55	3.75	2.6	2.2	2.66	3.9
19	5.85	.....	.....	6.75	10.6	5.25	4.5	3.95	2.45	2.15	2.66	3.8
20	.....	.....	.....	6.55	10.2	5.0	4.6	4.05	2.5	2.2	2.71	3.8
21	.....	.....	.....	6.5	9.6	5.1	4.9	3.8	2.4	2.2	2.64	3.9
22	.....	.....	.....	6.4	8.8	5.2	4.55	3.75	2.3	2.1	2.38	3.8
23	.....	.....	.....	6.55	8.5	5.25	4.35	3.5	2.2	2.1	2.03	3.7
24	.....	.....	.....	7.25	8.25	4.95	4.15	3.25	2.2	1.95	2.35	3.6
25	.....	.....	.....	8.1	7.9	4.8	4.0	3.4	2.3	1.55	2.40	3.6
26	.....	.....	.....	8.6	7.6	4.9	3.85	3.35	2.15	1.4	2.37	3.5
27	.....	.....	.....	9.75	7.7	4.75	3.8	3.35	1.45	1.9	2.67	3.6
28	.....	.....	8.8	11.7	7.8	4.4	4.0	3.35	1.05	2.54	2.94	3.7
29	.....	.....	8.9	13.3	7.6	4.15	3.9	3.3	1.25	2.88	2.86	3.6
30	.....	.....	8.85	13.25	7.5	4.45	3.8	3.2	1.5	2.74	2.77	3.6
31	.....	.....	8.45	.....	7.85	.....	3.85	3.2	.....	2.78	.....	3.7

NOTE.—River frozen January 1 to April 22, 1907, and from January 20 to March 27, and December 4 to 31, 1908. River open at the gage, April 1 to 22, 1907. Gage readings December 7 to 31, 1908, to water surface in a hole cut in the ice.

Rating table for Penobscot River at West Enfield, Me., for 1901–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.00	1,630	2.50	3,920	3.90	7,330	6.60	16,550
1.10	1,710	2.60	4,130	4.00	7,620	6.80	17,390
1.20	1,810	2.70	4,340	4.20	8,210	7.00	18,260
1.30	1,930	2.80	4,560	4.40	8,810	8.00	23,200
1.40	2,060	2.90	4,790	4.60	9,430	9.00	29,000
1.50	2,200	3.00	5,020	4.80	10,070	10.00	35,450
1.60	2,350	3.10	5,260	5.00	10,720	11.00	42,350
1.70	2,500	3.20	5,500	5.20	11,380	12.00	49,750
1.80	2,660	3.30	5,740	5.40	12,060	13.00	57,600
1.90	2,830	3.40	5,990	5.60	12,750	14.00	65,600
2.00	3,000	3.50	6,240	5.80	13,460	15.00	73,800
2.10	3,170	3.60	6,500	6.00	14,200	16.00	82,100
2.20	3,350	3.70	6,770	6.20	14,960	17.00	90,500
2.30	3,530	3.80	7,050	6.40	15,740	18.00	99,000
2.40	3,720						

NOTE.—The above table supersedes all ratings previously published for this station. It is not applicable for ice or obstructed-channel conditions. It is based on 68 discharge measurements made during 1901–1908, and is well defined.

Monthly discharge of Penobscot River at West Enfield, Me., for 1907–8.

[Drainage area, 6,600 square miles.[a]]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	.....	6,820	1.03	1.19	C.
February	.....	.....	3,960	.600	.62	C.
March	.....	.....	2,930	.444	.51	C.
April	80,000	.....	17,600	2.67	2.98	A.
May	91,400	22,400	40,200	6.10	7.03	A.
June	31,200	10,400	19,900	3.02	3.37	A.
July	31,800	11,200	17,600	2.67	3.08	A.
August	18,700	6,630	10,800	1.64	1.89	A.
September	11,900	5,380	7,580	1.15	1.28	A.
October	18,300	6,120	10,100	1.53	1.76	A.
November	43,800	13,800	22,400	3.39	3.78	A.
December	39,600	7,910	16,800	2.55	2.94	A.
The year	91,400	.....	14,700	2.23	30.43	
1908.						
January	14,600	.....	11,300	1.71	1.97	C.
February	.....	.....	10,400	1.58	1.70	C.
March	28,400	.....	11,200	1.70	1.96	C.
April	60,000	15,700	22,600	3.42	3.82	A.
May	68,900	20,600	39,400	5.97	6.88	A.
June	42,000	8,060	17,800	2.70	3.01	A.
July	10,400	5,380	7,900	1.20	1.38	A.
August	7,760	4,560	6,000	.909	1.05	A.
September	6,120	1,670	4.220	.639	.71	B.
October	4,740	2,060	3,450	.523	.60	B.
November	4,880	3,050	4,040	.612	.68	B.
December	.....	.....	3,960	.600	.69	C.
The year	68,900	.....	11,900	1.80	24.45	

[a] Includes Chamberlain Lake drainage, 270 square miles.

NOTE.—Estimates of discharge during winter periods 1907–8 taken as the sum of the four stations above West Enfield, viz: Millinocket, Grindstone, Mattawamkeag, and Foxcroft, plus an inflow below these four stations and above West Enfield. The rate of inflow per square mile was assumed to be about equivalent to the average rate of Foxcroft and Mattawamkeag for the period in question.

EAST BRANCH OF PENOBSCOT RIVER AT GRINDSTONE, ME.

The East Branch of the Penobscot originally had its headwaters in Webster and East Branch streams in the north central part of Maine, but since 1845 about 270 square miles of additional territory, draining to Chamberlain Lake, have contributed in part to the flow of this stream, as explained in more detail under the description of the St. John drainage basin. The basin of the East Branch, which, including the 270 square miles of the St. John area, comprises an area of 1,100 square miles, is completely forested and largely wild, has much undeveloped water power, and affords excellent opportunities for water storage.

The gaging station, which has been maintained to obtain data regarding the total flow of the river, was established October 23, 1902, at the Bangor and Aroostook Railroad bridge, one-half mile south of the railroad station at Grindstone. It is about 8 miles above the junction of the East Branch with the Penobscot at Medway. No water power is used on the river above the station, but dams are maintained at the outlet of several of the lakes and ponds near the source of the river, and the impounded water is used for log driving.

The datum of the gage has remained the same during the maintenance of the station. The discharge is affected by ice during the winter months, and in the log-driving season jams at the station and at Grindstone Falls immediately below are liable to materially vitiate the published results of discharge. Conditions for obtaining accurate discharge data are good, except at low stages, when the current becomes very sluggish. A good rating curve has been developed, although more measurements are required at extreme low and extreme high stages.

Discharge measurements of East Branch of Penobscot River at Grindstone, Me., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
February 21[a]	F. E. Pressey	258	1,650	6.83	1,340
April 23	do	260	1,810	6.16	1,950
October 5	do	241	1,370	4.56	393
October 31	Wood and French	249	1,400	4.69	433
December 2	F. E. Pressey	246	1,480	5.13	733

[a] Gage height to top of ice, 6.83 feet. Average thickness of ice, 1.6 feet.

Daily gage height, in feet, of East Branch of Penobscot River at Grindstone, Me., for 1907–8.

[J. B. Chamberlain, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4.4	4.4	4.4	4.6	12.05	9.4	9.0	6.7	5.25	4.85	4.95	6.35
2	4.4	4.4	4.4	4.6	12.15	9.6	8.95	6.6	5.1	4.75	4.95	6.35
3	4.35	4.4	4.4	4.6	11.4	9.45	8.75	6.55	5.25	4.75	5.5	6.45
4	4.35	4.4	4.4	4.6	10.5	9.45	8.6	6.25	5.65	4.8	6.65	6.45
5	4.3	4.4	4.45	4.6	9.95	9.25	8.55	5.95	6.05	4.85	7.4	6.45
6	4.3	4.4	4.5	4.6	9.65	9.1	8.3	5.7	5.8	4.9	8.1	6.55
7	4.3	4.4	4.5	4.6	9.3	8.9	8.0	5.55	5.65	5.0	8.85	6.55
8	4.3	4.4	4.5	4.7	9.5	8.8	7.9	5.1	5.45	5.15	9.15	6.55
9	4.3	4.4	4.5	4.7	9.6	8.5	7.8	4.95	5.35	5.35	9.45	6.65
10	4.3	4.4	4.5	4.7	9.65	8.25	7.9	5.1	5.2	5.65	9.4	6.75
11	4.3	4.4	4.5	4.7	9.6	7.95	7.6	5.3	5.15	5.7	8.95	7.25
12	4.3	4.4	4.5	4.7	9.75	7.85	7.45	5.45	5.15	5.65	8.7	9.4
13	4.3	4.4	4.5	4.7	9.85	7.65	7.55	5.75	5.05	5.55	8.2	9.05
14	4.3	4.4	4.5	4.9	9.8	7.8	7.4	5.9	5.05	5.3	7.45	8.75
15	4.3	4.4	4.5	5.1	9.75	7.8	7.2	5.95	5.1	5.1	6.65	8.65
16	4.3	4.4	4.5	5.2	10.0	7.5	6.95	6.25	5.05	4.95	6.05	8.05
17	4.3	4.4	4.5	5.25	9.95	7.3	6.7	6.45	4.95	4.85	5.8	7.65
18	4.3	4.4	4.5	5.3	10.45	7.2	6.55	6.55	4.85	4.85	5.95	6.9
19	4.3	4.4	4.5	5.3	10.7	7.1	6.15	6.65	4.9	4.85	6.05	6.85
20	4.3	4.4	4.5	5.3	10.5	7.0	5.5	6.4	4.95	4.85	6.15	6.6
21	4.3	4.4	4.5	5.4	9.95	7.3	5.1	6.15	4.95	4.9	6.35	6.55
22	4.3	4.4	4.5	5.45	9.8	7.45	4.9	5.9	4.95	5.05	6.35	6.5
23	4.3	4.4	4.5	5.5	9.6	7.5	5.85	5.65	5.05	5.15	6.35	6.45
24	4.3	4.4	4.5	5.75	9.6	8.05	6.25	5.5	5.1	5.1	6.35	6.1
25	4.3	4.4	4.5	6.4	9.45	8.45	6.1	5.6	5.15	5.0	6.35	5.95
26	4.3	4.4	4.5	7.9	9.5	8.6	6.0	5.7	5.25	4.95	6.45	5.85
27	4.3	4.4	4.6	9.0	9.35	8.75	5.8	5.9	5.25	4.95	6.55	5.65
28	4.3	4.4	4.6	9.55	9.1	8.95	6.25	5.95	5.25	4.95	6.55	5.55
29	4.3	.....	4.6	10.1	9.0	9.25	6.7	5.75	5.2	4.85	6.35	5.5
30	4.3	.....	4.6	11.6	9.15	9.1	7.0	5.6	4.9	4.9	6.35	5.45
31	4.35	.....	4.6	.....	9.15	.....	6.75	5.35	.....	4.95	.....	5.4
1908.												
1	6.05	4.95	6.8	6.85	9.4	9.75	6.2	5.55	4.55	5.65	4.6	4.95
2	6.3	4.9	6.65	6.8	11.05	8.5	5.55	5.45	4.5	5.5	4.5	5.0
3	6.5	4.85	6.4	6.45	10.6	8.15	4.9	5.35	4.55	4.7	4.5	.....
4	6.55	4.85	6.35	6.35	10.0	8.0	4.9	5.3	4.45	4.65	4.5	4.45
5	6.45	4.85	6.35	6.45	9.85	7.55	4.95	5.25	4.45	4.65	4.4	.....
6	6.35	4.85	6.35	6.45	9.4	7.5	5.05	5.5	4.45	4.6	4.4	.....
7	6.25	4.85	6.35	6.55	9.2	7.05	5.95	5.5	4.45	4.45	4.3	.....
8	6.2	4.85	6.35	6.55	9.05	6.8	7.2	5.35	4.45	4.4	4.3	.....
9	5.95	4.85	6.45	6.6	9.25	6.85	7.2	5.0	4.35	4.3	4.4	.....
10	5.95	4.85	6.45	6.65	9.35	6.8	5.8	4.7	4.35	4.25	4.35	4.05
11	5.95	4.85	6.45	6.65	9.2	6.75	7.1	4.6	5.3	4.4	4.45	.....
12	5.95	4.85	6.45	6.15	8.0	6.7	7.2	4.5	5.55	4.7	4.6	.....
13	5.85	4.85	6.45	6.1	7.9	6.65	6.55	4.6	5.45	4.6	4.7	.....
14	5.85	4.95	6.45	5.85	8.25	6.55	5.75	5.7	5.4	4.5	4.6	4.0
15	5.85	5.15	6.45	5.85	8.3	6.35	7.3	5.45	5.2	4.35	4.6	.....
16	5.85	5.35	6.45	5.85	8.35	6.15	7.45	5.1	5.1	4.25	4.65	.....
17	5.85	5.75	6.45	6.05	8.2	6.4	7.35	4.95	4.95	4.2	4.65	3.95
18	5.85	5.95	6.6	6.6	8.2	6.05	7.35	5.15	5.05	4.2	.....	.....
19	5.5	6.25	6.65	6.7	8.25	5.95	7.3	5.55	5.05	4.2	.....	.....
20	5.35	6.45	6.65	6.7	8.2	6.15	7.15	5.2	4.75	4.2	.....	.....
21	5.25	6.7	6.65	6.75	7.25	6.35	7.05	5.0	4.65	4.1	.....	.....
22	5.05	6.85	6.75	6.75	7.7	6.3	7.5	4.85	4.55	4.1	11.1	3.85
23	4.95	6.85	6.75	6.45	7.3	6.05	7.55	4.9	4.45	4.1	.....	.....
24	4.95	6.85	6.75	6.5	6.95	5.9	6.9	5.45	4.35	4.1	.....	.....
25	4.95	6.85	6.75	7.0	7.7	5.6	6.3	6.0	4.35	4.1	.....	.....
26	4.95	6.85	6.85	8.75	8.4	6.4	6.15	5.9	4.35	4.1	5.25	3.85
27	4.95	6.85	6.85	8.95	8.2	6.7	6.0	5.8	4.35	4.4	5.4	.....
28	4.95	6.85	6.85	9.55	8.45	6.7	5.8	5.65	4.35	5.1	5.65	.....
29	4.95	6.85	6.85	10.05	8.25	6.7	5.75	5.25	4.25	4.75	5.3	3.75
30	4.95	.....	6.85	9.8	8.05	6.75	5.65	4.85	5.75	4.7	5.1	.....
31	4.95	.....	6.85	.....	9.3	.....	5.6	4.55	.....	4.6	.....	.....

NOTE.—River frozen January 1 to April 23, 1907, about January 3 to April 22, November 17 to 25, and December 3 to 31, 1908. During 1907 gage heights are to the top of the ice, except during March, when there was a considerable depth of water on the ice. During 1908 gage heights were taken to water surface in a hole cut in the ice. During May and June, 1907, the gage heights were affected by accumulations of logs at the bridge and below.

Rating table for East Branch of Penobscot River at Grindstone, Me., for 1902–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
4.10	210	5.60	1,130	7.10	3,310	9.20	8,380
4.20	240	5.70	1,235	7.20	3,495	9.40	8,980
4.30	275	5.80	1,345	7.30	3,685	9.60	9,580
4.40	315	5.90	1,460	7.40	3,880	9.80	10,180
4.50	360	6.00	1,580	7.50	4,080	10.00	10,780
4.60	405	6.10	1,705	7.60	4,285	10.20	11,380
4.70	455	6.20	1,840	7.70	4,495	10.40	12,000
4.80	510	6.30	1,980	7.80	4,710	10.60	12,620
4.90	570	6.40	2,130	7.90	4,930	10.80	13,240
5.00	630	6.50	2,285	8.00	5,155	11.00	13,860
5.10	700	6.60	2,445	8.20	5,620	12.00	16,960
5.20	775	6.70	2,610	8.40	6,110	13.00	20,160
5.30	855	6.80	2,780	8.60	6,630		
5.40	940	6.90	2,955	8.80	7,190		
5.50	1,030	7.00	3,130	9.00	7,780		

NOTE.—The above rating supersedes all ratings previously published for this station. The table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1902–1908 and is well defined.

Monthly discharge of East Branch of Penobscot River at Grindstone, Me., for 1907–8.

[Drainage area, 1,100 square miles.[a]]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907[b].						
January	.....	.....	800	0.727	0.84	D.
February	.....	.....	350	.318	.33	D.
March	.....	.....	300	.273	.31	D.
April	15,700	.....	1,970	1.79	2.00	B.
May	17,400	.....	8,000	7.27	8.38	D.
June	.....	.....	5,000	4.55	5.08	D.
July	7,780	570	3,590	3.26	3.76	B.
August	2,610	600	1,500	1.36	1.57	A.
September	1,640	540	797	.725	.81	A.
October	1,240	482	684	.622	.72	A.
November	9,130	600	3,450	3.14	3.50	A.
December	8,980	940	2,970	2.70	3.11	A.
The year	17,400	.....	2,450	2.23	30.41	
1908.[c]						
January	1,980	.....	928	.844	.97	D.
February	1,340	.....	688	.625	.67	D.
March	.....	.....	1,040	.945	1.09	D.
April	10,900	.....	2,710	2.46	2.74	B.
May	14,000	3,040	6,930	6.30	7.26	A.
June	10,000	1,130	2,960	2.69	3.00	A.
July	4,180	570	2,340	2.13	2.46	A.
August	1,580	360	838	.762	.88	A.
September	1,290	258	511	.464	.52	A.
October	1,180	210	380	.345	.40	A.
November	1,180	275	434	.395	.44	A.
December	630	.....	175	.159	.18	D.
The year	14,000	.....	1,660	1.51	20.61	

[a] Includes Chamberlain Lake drainage, 270 square miles.

[b] Discharge during the frozen period, 1907, based largely on the natural flow of West Branch of Penobscot River at Millinocket.

Discharge for May and June, 1907, are rough estimates to allow as nearly as possible for the effect of log jams.

Discharge April 1 to 23, 1907, 600 second-feet.

[c] Discharge during the frozen periods, 1908, based on climatological reports, the discharge of adjacent drainages, and one discharge measurement made under ice conditions.

	Second-feet.
Discharge April 1 to 22, 1908	1,300
November 18 to 25, 1908	300

MATTAWAMKEAG RIVER AT MATTAWAMKEAG, ME.

Mattawamkeag River rises near the eastern boundary of Maine and drains a country that is generally low and swampy, although there are on the river a few good sites for power development, none of which have been utilized. Dams are maintained at the outlets of several large lakes and ponds in this drainage basin, but the stored water is used merely for log driving. The total area of the basin is about 1,500 square miles.

The gaging station, which was established August 26, 1902, for the purpose of obtaining general statistical data regarding the total flow of the river, is located at the Maine Central Railroad bridge in the village of Mattawamkeag, about half a mile from the mouth of the river.

The datum of the gage has remained the same during the maintenance of the station. The discharge is affected by ice during the winter and is also occasionally affected by log jams for short periods in the log-driving season. When the channel is unobstructed, conditions are good for obtaining accurate discharge data. A very good rating curve has been developed.

Discharge measurements of Mattawamkeag River at Mattawamkeag, Me., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.[a]	Gage height.[b]	Thickness of ice.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Feet.*	*Feet.*	*Sec.-ft.*
March 6	F. E. Pressey	388	298	5.94	5.94	2.1	482
March 26	do	308	482	6.40	6.50	1.9	752
May 8	do	404	3,070	10.84			15,000
June 4	do	398	1,420	6.54			4,180
1908.							
March 20	F. E. Pressey	280	1,820	8.58	8.66	1.5	2,270
March 21	do	378	1,190	8.46	8.56	2.0	2,970
April 15	do	394	1,400	6.70			4,380
November 2	Wood and French	365	707	5.03			1,670
December 10 [c]	F. E. Pressey	349	675	5.38			1,100
December 23	do	350	600	5.40	5.40	.9	640

[a] To water surface. [b] To top of ice. [c] Discharge affected by anchor ice.

Daily gage height, in feet, of Mattawamkeag River at Mattawamkeag, Me., for 1907–8.

[W. T. Mincher, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	.....	.....	.....	13.7	5.75	8.5	6.45	4.25	4.8	5.6	5.8
2	.....	.....	5.9	.....	13.9	5.75	8.6	6.75	3.95	4.8	5.6	5.8
3	.....	6.6	.....	.....	13.6	6.05	8.6	6.8	3.8	4.7	5.65	5.9
4	.....	.....	.....	.....	.....	6.55	8.5	6.65	3.9	4.6	6.05	6.0
5	7.2	.....	.....	.....	.....	6.6	8.1	6.5	4.6	4.5	6.2	6.1
6	.....	.....	5.95	8.3	.....	6.85	7.85	6.5	5.0	4.55	6.25	6.2
7	.....	.....	.....	.....	10.65	7.05	7.4	6.6	5.55	4.75	6.6	6.3
8	.....	.....	.....	.....	10.3	7.2	7.05	6.5	5.65	5.15	7.3	6.3
9	.....	.....	.....	.....	9.8	7.75	6.85	6.3	5.45	5.8	7.65	6.3
10	.....	.....	6.0	.....	9.2	7.75	6.65	6.05	5.3	6.45	7.8	6.4
11	.....	.....	.....	.....	8.75	7.55	6.4	5.75	5.15	6.85	7.6	6.7
12	7.4	.....	.....	.....	8.35	7.35	6.2	5.55	5.0	7.0	7.25	7.7
13	.....	.....	.....	.....	8.15	7.15	6.05	5.4	5.1	6.75	6.9	8.5
14	.....	.....	.....	9.0	7.85	6.9	6.0	5.35	5.05	6.55	6.6	8.6
15	.....	.....	.....	.....	7.25	6.55	6.0	5.2	4.9	6.4	6.5	8.35
16	.....	.....	.....	.....	7.05	6.3	5.9	5.1	4.8	6.3	6.5	7.9
17	.....	.....	6.2	9.1	6.8	5.85	5.9	5.0	4.7	6.05	6.4	7.45
18	.....	.....	.....	8.85	6.7	5.35	5.9	4.85	4.6	5.85	6.3	7.15
19	.....	.....	.....	7.9	6.6	5.3	5.8	4.75	4.6	5.7	6.05	6.7
20	6.4	.....	.....	8.15	6.55	5.15	5.7	4.7	4.6	5.55	5.85	6.4
21	.....	.....	.....	8.2	6.7	5.1	5.7	4.7	4.6	5.4	5.65	6.4
22	.....	.....	.....	8.65	6.85	5.00	5.9	4.6	4.55	5.3	5.5	6.3
23	.....	.....	.....	9.1	6.9	4.9	5.9	4.6	4.4	5.15	5.5	6.1
24	.....	.....	6.6	9.35	6.5	5.0	5.9	4.5	4.4	5.1	5.6	6.0
25	.....	.....	.....	9.95	6.05	5.25	5.8	4.55	4.7	5.0	5.6	6.2
26	.....	5.8	6.4	11.05	5.9	5.55	5.8	4.6	5.15	4.9	5.6	6.4
27	6.5	.....	.....	11.6	5.85	5.9	5.7	4.6	5.6	4.95	5.9	6.5
28	.....	.....	.....	12.15	6.25	6.75	5.8	4.55	5.2	5.45	5.8	6.45
29	.....	.....	.....	12.5	6.4	7.85	5.8	4.4	4.85	5.6	5.8	6.3
30	.....	.....	.....	13.05	6.3	8.35	5.8	4.3	4.8	5.7	5.8	6.15
31	.....	.....	7.0	.....	6.15	.....	6.0	4.4	.....	5.7	.....	6.0
1908.[b]												
1	6.0	.....	8.5	.....	11.2	7.35	4.25	3.35	3.1	2.65	4.8	4.6
2	6.0	.....	.....	.....	11.55	8.5	4.15	3.35	3.0	3.05	5.15	4.7
3	6.0	8.0	.....	.....	11.5	.....	4.05	3.25	3.1	3.7	4.9	4.9
4	6.0	.....	.....	.....	11.35	.....	3.95	3.15	3.1	4.3	4.45	5.0
5	6.0	.....	.....	.....	11.1	8.45	3.95	3.05	3.1	4.4	4.4	4.75
6	6.0	.....	.....	.....	10.65	7.85	3.85	3.15	3.1	4.3	4.4	4.8
7	6.0	.....	7.8	.....	10.2	7.3	3.75	3.3	3.2	4.0	4.3	4.8
8	6.0	.....	.....	9.05	9.85	6.9	3.75	3.5	3.4	3.9	4.2	4.9
9	6.3	.....	.....	9.2	9.7	6.7	3.75	3.6	3.5	3.75	4.1	5.15
10	6.5	7.5	.....	9.1	9.75	6.45	3.75	3.7	3.5	3.6	4.1	5.3
11	6.8	.....	.....	9.1	9.9	6.45	3.75	3.8	3.4	3.6	4.1	5.3
12	6.8	.....	.....	.....	9.9	6.3	3.65	3.8	3.4	3.7	4.0	5.4
13	6.7	.....	.....	.....	9.65	6.15	3.55	3.9	3.3	3.7	4.1	5.4
14	6.6	.....	.....	.....	9.3	5.95	3.55	3.75	3.2	3.7	4.2	5.4
15	.....	.....	7.3	6.7	9.05	5.4	3.45	3.45	3.0	3.6	4.25	5.4
16	.....	8.5	.....	6.9	8.9	5.4	3.45	3.75	2.9	3.6	4.45	5.4
17	.....	8.5	.....	7.0	8.75	5.95	3.45	3.8	2.9	3.5	4.55	5.5
18	.....	.....	.....	7.05	8.45	6.05	3.45	3.95	2.8	3.4	4.4	5.6
19	.....	.....	.....	7.0	7.95	5.95	3.55	4.0	2.8	3.3	4.3	5.6
20	8.0	.....	8.6	6.9	7.65	5.95	3.55	4.1	2.8	3.2	4.2	5.1
21	.....	.....	8.5	6.8	7.25	5.85	3.55	4.1	2.7	3.1	4.1	.....
22	.....	.....	8.3	6.8	6.75	5.7	3.55	4.0	2.7	3.1	4.1	.....
23	.....	8.5	.....	6.9	6.6	5.4	3.55	3.9	2.6	3.0	4.0	5.4
24	.....	.....	.....	7.0	6.4	5.4	3.6	3.8	2.5	2.9	4.2	.....
25	.....	.....	.....	7.55	6.2	5.2	3.65	3.7	2.5	2.8	4.1	.....
26	8.0	.....	.....	8.15	5.95	5.05	3.55	3.6	2.5	2.95	3.9	.....
27	.....	.....	.....	9.05	5.8	4.95	3.45	3.5	2.5	3.3	4.05	5.0
28	.....	.....	.....	9.7	5.95	4.6	3.35	3.5	2.5	3.4	4.2	.....
29	.....	.....	.....	9.85	5.95	4.25	3.35	3.4	2.5	3.55	4.3	.....
30	.....	.....	.....	10.45	5.95	4.15	3.35	3.3	2.6	3.8	4.4	.....
31	.....	.....	.....	.....	6.35	.....	3.35	3.2	.....	4.35	.....	.....

[a] River frozen January 1 to April 18, 1907. During the frozen season gage heights were taken to water surface in a hole cut in the ice. June 14, 1907, all logs out of the river.

[b] River frozen from about January 5 to April 7, and from about December 1 to 31, 1908. During the frozen season gage heights were taken to water surface in a hole cut in the ice. Gage heights affected by log jams from about June 2 to 14, 1908.

Rating table for Mattawamkeag River at Mattawamkeag, Me., for 1902–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.50	86	3.90	590	5.30	2,080	7.40	5,920
2.60	100	4.00	660	5.40	2,220	7.60	6,360
2.70	114	4.10	736	5.50	2,360	7.80	6,810
2.80	134	4.20	818	5.60	2,500	8.00	7,270
2.90	160	4.30	906	5.70	2,660	8.20	7,750
3.00	190	4.40	1,000	5.80	2,820	8.40	8,230
3.10	223	4.50	1,100	5.90	2,980	8.60	8,730
3.20	258	4.60	1,210	6.00	3,160	8.80	9,230
3.30	295	4.70	1,320	6.20	3,520	9.00	9,750
3.40	334	4.80	1,440	6.40	3,900	10.00	12,520
3.50	375	4.90	1,560	6.60	4,280	11.00	15,570
3.60	420	5.00	1,690	6.80	4,680	12.00	18,620
3.70	470	5.10	1,820	7.00	5,080	13.00	21,670
3.80	525	5.20	1,950	7.20	5,490	14.00	24,720

NOTE.—The above table supersedes all ratings previously published for this station. It is not applicable for ice or obstructed-channel conditions. It is based on 25 discharge measurements made during 1902 to 1908 and is well defined between gage heights 2.5 feet and 12 feet.

Rating table for Mattawamkeag River at Mattawamkeag, Me., for ice cover only, from December 4, 1906, to December 31, 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.80	460	4.70	820	5.60	1,450	6.50	2,200
3.90	480	4.80	880	5.70	1,530	6.60	2,290
4.00	510	4.90	940	5.80	1,610	6.70	2,380
4.10	540	5.00	1,000	5.90	1,690	6.80	2,470
4.20	580	5.10	1,070	6.00	1,770	6.90	2,560
4.30	620	5.20	1,140	6.10	1,850	7.00	2,650
4.40	670	5.30	1,210	6.20	1,930	7.10	2,740
4.50	720	5.40	1,290	6.30	2,020	7.20	2,830
4.60	770	5.50	1,370	6.40	2,110		

NOTE.—The above table is based on two discharge measurements made during 1907, and is approximate. Gage heights are to bottom of ice.

Monthly discharge of Mattawamkeag River at Mattawamkeag, Me., for 1907–8.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.[a]						
January	1,850	880	1,330	0.887	1.02	D.
February	1,000	480	740	.493	.51	D.
March	1,290	470	694	.463	.53	B.
April	21,900	1,290	6,690	4.46	4.98	A.
May	24,400	2,900	9,070	6.05	6.98	A.
June	8,110	1,560	3,970	2.65	2.96	A.
July	8,730	2,660	4,260	2.84	3.27	A.
August	4,680	906	2,350	1.57	1.81	A.
September	2,580	525	1,500	1.00	1.12	A.
October	5,080	1,100	2,520	1.68	1.94	A.
November	6,810	2,360	3,680	2.45	2.73	A.
December	8,730	2,820	4,410	2.94	3.39	A.
The year	24,400	470	3,430	2.29	31.24	

[a] Discharge during the frozen period 1907 determined from an approximate ice rating. Discharge May 4 to 6, 1907, interpolated. Discharge April 1 to 18, 1907, 2,330 second-feet. Discharge probably not affected by ice conditions during December, 1907.

Monthly discharge of Mattawamkeag River at Mattawamkeag, Me., for 1907–8—Cont'd.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.[a]						
January			2,980	1.99	2.29	D.
February			2,510	1.67	1.80	D.
March			2,280	1.52	1.75	D.
April	13,900		6,780	4.52	5.04	C.
May	17,200	2,820	9,160	6.11	7.04	A.
June	8,000	777	3,500	2.33	2.60	B.
July	862	314	457	.305	.35	A.
August	736	206	443	.295	.34	A.
September	375	86	191	.127	.14	A.
October	1,000	107	429	.286	.33	A.
November	1,880	590	919	.613	.68	A.
December	1,100	400	722	.481	.55	B.
The year	17,200	86	2,530	1.69	22.91	

[a] Discharge during the frozen periods 1908 based on the 1907 ice rating, climatological reports and on four discharge measurements made under ice conditions. Discharge April 12 to 14 and June 2 to 14, estimated.

	Second-feet.
Discharge April 1 to 14, 1908	6,660
June 2 to 14, 1908	4,920

PISCATAQUIS RIVER NEAR FOXCROFT, ME.

Piscataquis River rises in the hilly and mountainous region south and east of Moosehead Lake, flows for about 50 miles in an easterly direction, and enters the Penobscot at Howland. Its slopes and valleys are generally steep and the regimen of flow is therefore quite variable. Sebec, Schoodic, and Seboois streams, all outlets of large lakes having the same names, are the principal tributaries.

The gaging station, which was established August 17, 1902, to obtain general statistical data regarding the flow of the upper Piscat a quis, is located at Low's bridge, about half way between the villages of Guilford and Foxcroft, and is just above the mouths of Black and Salmon streams. Water power is used at several manufacturing plants within a few miles above the station, and the river fluctuates considerably at the gage during low stages. The little storage on the river above this point is used solely for log driving.

The gage datum has remained the same during the maintenance of the station. During the winter the discharge is affected by ice. Conditions for obtaining accurate discharge data are good, and a very good rating curve has been developed for medium stages. At high and low stages the curve is not yet accurately defined.

Discharge measurements of Piscataquis River near Foxcroft, Me., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 6	F. E. Pressey	118	247	3.19	550
October 30	Wood and French	103	198	2.69	269

Daily gage height, in feet, of Piscataquis River near Foxcroft, Me., for 1907–8.

[A. F. D. Harlow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	3.6	3.6	3.4	4.5	9.4	3.6	5.6	3.2	2.3	4.0	4.2	3.0
2	4.1	3.6	3.3	4.5	8.6	3.2	5.6	3.2	2.3	3.7	4.0	3.1
3	4.0	3.3	3.1	4.3	7.0	3.2	5.5	3.0	2.7	3.5	4.8	3.1
4	3.7	3.6	3.2	4.3	6.5	3.0	5.0	3.0	3.0	4.0	5.4	3.1
5	3.5	3.6	3.3	4.2	5.5	3.0	4.4	3.2	4.3	4.0	5.0	3.1
6	3.4	3.6	3.3	4.4	5.9	3.0	3.4	3.6	4.5	3.6	4.5	3.1
7	3.2	3.6	3.3	4.0	4.9	2.8	3.4	4.2	3.9	3.5	9.3	3.1
8	3.2	3.4	3.3	3.9	5.7	3.1	3.5	4.2	3.4	3.8	9.0	2.7
9	3.2	3.4	3.4	3.9	5.8	3.2	3.4	3.9	3.4	5.2	6.9	2.9
10	3.4	3.0	3.3	3.9	5.7	3.2	3.1	3.5	3.3	4.4	5.4	5.5
11	3.5	3.5	3.3	3.8	5.7	3.2	3.2	3.2	3.4	4.4	4.7	9.1
12	3.6	3.1	3.3	3.6	4.6	3.2	3.2	3.1	3.4	4.0	4.4	5.6
13	3.4	3.3	3.2	3.5	4.6	3.2	3.3	3.0	3.2	3.9	4.1	4.4
14	3.5	3.2	3.2	3.4	4.5	3.0	3.3	2.9	3.2	3.8	3.8	4.2
15	3.6	3.2	3.2	3.9	4.5	2.6	3.1	2.5	3.2	3.6	3.6	3.8
16	3.6	3.2	3.5	4.2	4.5	2.6	2.9	2.4	3.2	3.8	3.4	3.7
17	3.6	2.9	3.5	4.3	4.9	2.6	2.8	2.6	3.2	4.0	3.2	3.6
18	3.6	3.8	4.4	4.6	5.0	2.6	2.8	3.2	3.2	3.8	3.4	3.4
19	3.6	3.7	4.4	4.8	5.2	2.6	2.8	3.1	3.2	3.4	3.4	3.4
20	3.6	3.7	4.1	3.9	5.0	2.6	2.8	3.0	3.2	3.4	3.4	3.4
21	3.6	3.7	3.6	3.7	4.4	2.6	2.8	2.5	3.0	3.4	3.2	3.4
22	3.6	3.7	3.6	4.2	3.5	2.5	2.5	2.4	2.9	3.4	3.1	3.4
23	3.6	3.4	3.5	4.7	3.4	2.7	3.0	2.4	2.9	3.4	3.1	3.6
24	3.6	3.4	3.6	7.3	3.4	2.6	3.1	2.3	2.9	3.3	3.0	3.6
25	3.9	3.2	3.9	8.4	3.4	2.8	3.1	2.3	3.1	3.3	3.2	3.6
26	3.6	3.6	3.9	7.2	3.2	3.1	3.8	2.4	3.1	3.2	3.4	3.6
27	3.5	3.4	3.9	7.2	3.4	4.2	4.0	2.6	3.0	2.9	3.4	3.6
28	3.4	3.4	3.9	7.2	3.5	6.0	3.5	2.7	3.0	3.0	3.3	3.6
29	3.4	.....	3.9	7.0	4.4	4.4	3.3	2.5	2.8	5.4	3.1	3.6
30	3.4	.....	3.9	7.6	4.0	3.9	3.2	2.3	3.6	6.2	3.1	3.1
31	3.3	.....	4.4	.....	3.6	.....	3.2	2.3	.....	4.8	.....	3.1
1908.[b]												
1	3.8	3.6	3.55	3.65	8.6	5.1	2.1	2.05	2.25	2.2	1.9	2.2
2	3.8	3.6	3.55	3.75	8.1	4.5	1.95	2.1	2.25	2.5	1.95	2.45
3	3.8	4.0	3.55	4.05	6.75	4.15	1.95	2.3	2.15	2.2	1.95	2.6
4	3.8	4.1	3.55	4.35	6.7	3.8	1.95	2.2	2.1	1.9	2.05	2.5
5	3.65	4.25	3.55	3.8	5.7	3.4	1.8	2.45	2.1	2.2	1.95	2.4
6	3.65	4.25	3.55	3.25	5.55	3.4	1.8	2.95	2.1	2.2	1.8	2.25
7	4.05	4.25	3.35	3.5	5.35	3.2	1.75	2.95	2.1	2.2	1.8	2.25
8	4.1	4.25	3.35	3.65	4.55	3.2	1.7	2.95	2.25	2.2	1.6	2.25
9	4.5	3.85	3.35	3.75	5.25	3.05	1.7	2.95	2.3	2.2	1.8	2.5
10	4.0	3.85	3.35	3.9	5.55	2.8	1.7	2.9	2.3	2.2	1.8	2.5
11	3.5	3.7	3.35	3.75	5.25	2.4	1.7	2.85	2.4	1.9	1.8	2.5
12	3.5	3.7	3.35	4.1	4.4	2.4	1.65	2.7	2.4	2.35	1.8	2.5
13	3.4	3.6	3.35	3.95	4.5	2.3	2.2	2.7	2.4	2.1	1.8	1.8
14	3.4	3.6	3.3	3.75	4.5	2.3	2.2	2.45	2.4	1.95	1.8	2.4
15	3.3	4.0	3.4	3.7	4.5	2.3	2.2	2.45	2.3	1.95	1.6	2.4
16	3.2	4.6	3.4	4.1	4.4	2.3	2.2	2.45	2.15	1.95	1.6	2.4
17	3.2	4.9	4.4	4.2	4.3	2.3	2.2	2.5	2.15	1.95	1.6	2.4
18	3.2	4.7	4.35	3.8	4.1	2.3	2.2	2.5	2.0	1.7	1.6	2.5
19	3.25	4.25	3.85	3.55	3.95	2.3	2.2	2.5	2.0	1.95	1.5	2.5
20	3.3	4.25	3.6	4.0	3.9	2.3	2.2	2.4	2.0	1.95	1.4	1.7
21	3.2	4.25	3.4	4.0	3.8	2.2	2.2	2.3	2.2	1.95	1.2	2.45
22	3.2	4.0	3.4	3.95	3.6	2.3	2.15	2.0	2.2	1.95	1.0	2.4
23	3.2	3.6	3.35	4.3	3.5	2.25	2.2	2.0	2.2	1.95	1.45	2.4
24	3.2	3.6	3.5	4.95	3.35	2.25	2.25	2.0	2.2	1.95	1.6	2.45
25	3.2	3.55	3.9	5.35	3.3	2.25	2.1	2.0	2.2	1.6	1.85	2.4
26	3.0	3.55	4.25	6.35	3.3	2.1	1.9	1.95	2.2	1.95	2.2	2.4
27	3.55	3.4	4.1	7.9	3.55	2.1	1.9	1.95	1.4	2.45	2.6	2.45
28	3.55	3.4	3.85	8.1	3.7	2.1	1.9	1.9	1.8	2.75	3.0	2.45
29	3.65	3.4	3.7	8.6	3.55	2.25	1.9	1.9	1.95	2.5	2.55	2.45
30	3.6	.....	3.6	7.2	5.35	2.25	1.9	1.9	1.95	2.35	2.55	2.45
31	3.6	.....	3.6	.....	5.1	.....	1.9	1.9	.....	2.25	.....	2.35

[a] River frozen over more or less completely from about January 10 to April 7, 1907. During the frozen season gage heights were taken to water surface in a hole in the ice.

[b] Ice conditions prevailed from about February 1 to 15, 1908, and it is probable that the discharge may have been more or less affected by ice conditions for short periods during the remainder of the winter months.

Rating table for Piscataquis River near Foxcroft, Me., for 1902–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.00	5	2.30	123	3.60	858	5.80	3,610
1.10	7	2.40	148	3.70	938	6.00	3,970
1.20	9	2.50	180	3.80	1,023	6.20	4,335
1.30	12	2.60	220	3.90	1,113	6.40	4,705
1.40	15	2.70	267	4.00	1,208	6.60	5,080
1.50	19	2.80	318	4.20	1,403	6.80	5,460
1.60	24	2.90	374	4.40	1,615	7.00	5,840
1.70	31	3.00	437	4.60	1,840	8.00	7,810
1.80	40	3.10	502	4.80	2,085	9.00	9,860
1.90	51	3.20	569	5.00	2,350	10.00	11,960
2.00	64	3.30	638	5.20	2,635		
2.10	81	3.40	709	5.40	2,940		
2.20	100	3.50	782	5.60	3,265		

NOTE.—The above table supersedes all ratings previously published for this station. It is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1902 to 1908 and is well defined between gage heights 1.5 feet and 7 feet.

Monthly discharge of Piscataquis River near Foxcroft, Me., for 1907–8.

[Drainage area, 286 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	1,300	.....	499	1.75	2.02	D.
February	.....	.....	250	.874	.91	D.
March	.....	.....	300	1.05	1.21	D.
April	8,610	.....	2,400	8.39	9.36	A.
May	10,700	569	2,650	9.27	10.69	A.
June	3,970	180	618	2.16	2.41	A.
July	3,260	180	913	3.19	3.68	A.
August	1,400	123	447	1.56	1.80	A.
September	1,720	123	598	2.09	2.33	A.
October	4,340	374	1,190	4.16	4.80	A.
November	10,500	437	1,880	6.57	7.33	A.
December	10,100	267	1,190	4.16	4.80	A.
The year	10,700	.....	1,080	3.77	51.34	
1908.						
January	1,720	437	822	2.87	3.31	D.
February	2,220	.....	796	2.78	3.00	D.
March	1,620	638	880	3.08	3.55	D.
April	9,040	604	2,190	7.66	8.55	A.
May	9,040	638	2,370	8.29	9.56	A.
June	2,490	81	408	1.43	1.60	A.
July	100	28	68.1	.238	.27	B.
August	405	51	171	.598	.69	A.
September	148	15	95	.332	.37	B.
October	292	24	92.6	.324	.37	B.
November	437	5	67.6	.236	.26	B.
December	220	31	148	.518	.60	C.
The year	9,040	5	676	2.36	32.13	

NOTE.—Estimates of discharge during the frozen periods 1907–8, based on climatological reports and the discharge of adjacent drainages.

KENDUSKEAG STREAM NEAR BANGOR, ME.

This station, which was established September 15, 1908, to obtain general statistical data regarding the total flow of the Kenduskeag Stream, is located at the wooden highway bridge about 6 miles northwest of the Bangor post-office and is just below the Six-

mile Falls, which is the best unutilized site for power development on the lower stretch of the river. Gage heights are furnished by Fred Cort, of Bangor. At this point the drainage area is 168 square miles; at the mouth of the river it is 193 square miles. In addition, about 35 square miles of the drainage basin of Sousdabscook Stream are in part tributary to the Kenduskeag via Black Stream, which unites these two rivers, entering the Kenduskeag about 8 miles above the gaging station.

The datum of the gage has remained the same during the maintenance of the station. During the winter months the discharge is somewhat affected by ice. Conditions for obtaining accurate discharge data are good, but no rating table has been published because of the few discharge measurements made up to this time.

Discharge measurements of Kenduskeag Stream near Bangor, Me., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 25	F. E. Pressey	100	297	4.13	656
Do[a]	do	105	274	([b])	770
July 9[a]	do	82	56.3	([c])	28.6
Do	do	87	52.4	1.71	29.8
September 4	do	64	44.1	1.52	21.3
September 15	do	42	25.1	1.31	7.2
December 11	do	97	150	2.98	94.9
December 24	do	87	52.9	[d]2.08	40.1

[a] Gaging made from upstream side of highway bridge at East Bangor.
[b] Distance to water surface from the top of floor beam 100 feet from left abutment, 15.19 feet.
[c] Distance to water surface from the top of floor beam 100 feet from left abutment, 16.77 feet.
[d] Gage height to top of ice, 2.14 feet; average thickness of ice, 0.58 foot.

Daily gage height, in feet, of Kenduskeag Stream near Bangor, Me., for 1908.

[Fred Cort, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		1.3	2.5	2.2	16	1.3	1.5	2.4	3.05
2		1.5	2.6	2.2	17	1.3	1.5	2.9	3.25
3		1.55	2.65	2.1	18	1.3	1.6	2.9	3.2
4		1.55	2.6	2.2	19	1.3	1.55	2.65	3.25
5		1.45	2.5	2.2	20	1.3	1.5	2.35	
6		1.4	2.4	2.3	21	1.3	1.5	2.05	
7		1.4	2.3	2.4	22	1.3	1.6	1.95	2.1
8		1.4	2.2	2.4	23	1.3	1.6	2.1	2.0
9		1.5	2.0	2.65	24	1.3	1.6	2.2	2.0
10		1.5	2.0	2.9	25	1.3	1.6	2.2	2.2
11		1.65	2.0	2.9	26	1.3	1.6	2.4	2.25
12		1.5	2.0	2.9	27	1.3	1.85	2.4	2.1
13		1.4	1.9	2.9	28	1.3	2.15	2.4	2.1
14		1.4	1.9	2.95	29	1.3	2.2	2.4	2.1
15	1.3	1.4	1.9	3.0	30	1.3	2.2	2.35	2.1
					31		2.5		2.2

NOTE.—Ice conditions prevailed from about December 19 to 26.

PHILLIPS LAKE AND OUTLETS IN HOLDEN AND DEDHAM, ME.

Phillips Lake receives the drainage from an area 11.5 square miles in extent and has a water surface of about 1.4 square miles. It is situated about 10 miles southeast of the city of Bangor. The shores

are generally rocky, and the adjacent country is mostly wooded and but sparsely settled. The water is apparently of excellent quality and of considerable depth. This lake was for some time under consideration as a source of water supply for the city of Bangor.

The lake has two drainage outlets. The greater amount of water flows from the north end of the lake northward through the village of East Holden, thence southward through Long Pond and into Penobscot River below Bucksport, a total length of 18 miles. The other outlet, situated at the southeast end of the lake, in the town of Dedham, flows into Green Lake and thence into Union River, discharge occurring only during medium and high stages. Gages have been maintained at the outlets of the lake and upon the lake itself for the purpose of determining the available water supply for public use.

The gage at the northern outlet was established July 7, 1904, and discontinued July 1, 1908. It is located about 1¼ miles from the lake, one quarter mile south of the village of East Holden, and 175 feet south of an old mill. The drainage area at this point is 12.3 square miles.

The gage at the southeast outlet was established July 19, 1904, and was read only at the time of visits by the hydrographers. It is located at the highway bridge about 1½ miles southeast of Lake House railroad station, and is about 700 feet southeast of the Maine Central Railroad crossing. The flow through this outlet is proportional to the lake height.

The gage on Phillips Lake was established July 19, 1904, and discontinued July 1, 1908. It was originally located at a point on the east shore of the lake about 300 feet northwest of Dr. L. S. Chilcott's cottage. On December 6, 1904, its location was changed to the Maine Central Railroad bridge over the north end of Phillips Lake, being still referred to the same datum.

The respective gage datums have remained the same during the maintenance of the stations.

Conditions for obtaining accurate discharge data at the two outlets are rather poor and the results are only approximate. Ice conditions probably do not affect the discharge materially.

Discharge measurements of Phillips Lake, northern outlet, at East Holden, Me., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907. December 16	F. E. Pressey	12	8.1	2.18	18.7
1908. April 24	F. E. Pressey	10	14.0	[a] 2.43	37.7

[a] Gage height varied from 2.18 feet to 2.68 feet during the measurement.

Discharge measurements of Phillips Lake, southeastern outlet, near Lake House railroad station, Me., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.		Discharge.
				Outlet.	Phillips Lake.	
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
Dec. 16, 1907	F. E. Pressey	8	14.9	2.50	9.05	24.5
Apr. 24, 1908	do	7	2.5	1.92	8.65	5.2

Daily gage height, in feet, of Phillips Lake, northern outlet, at East Holden, Me., for 1907–8.

[Lewis F. Pinkham, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1.9	1.9	4.9	2.5	1.7	1.8	1.95	2.1	1.8	2.25	1.7	2.2
2	1.9	1.9	3.8	2.1	2.6	2.0	2.5	2.1	1.75	1.9	1.7	2.2
3	1.9	1.9	2.0	1.8	2.0	2.5	2.05	2.1	1.7	1.85	2.1	2.2
4	1.9	1.9	2.0	1.8	2.5	2.5	2.0	2.05	1.7	1.8	1.95	2.2
5	1.9	1.9	2.4	2.5	2.0	2.4	1.9	2.05	1.75	1.8	1.9	2.2
6	1.9	1.9	2.4	2.5	2.55	2.0	1.9	2.05	1.75	1.8	1.9	2.15
7	1.9	1.9	2.2	1.7	2.55	2.0	1.8	2.05	1.8	2.2	2.4	2.1
8	1.9	2.0	2.2	2.4	2.5	2.0	1.8	2.05	2.0	2.1	2.2	2.0
9	1.9	2.0	2.2	2.4	2.2	1.8	1.9	2.05	1.95	2.05	2.2	1.95
10	1.9	2.9	2.1	2.5	2.0	2.4	1.95	2.05	1.8	2.0	2.1	1.95
11	2.5	3.5	2.1	2.55	2.1	2.0	1.95	2.05	1.8	1.9	2.1	2.55
12	2.2	3.0	2.05	2.3	2.45	2.0	2.5	2.05	1.9	1.8	2.1	2.4
13	2.1	3 0	2.0	2.3	2.45	2.4	2.55	2.05	1.9	1.8	2.2	2.3
14	1.85	2.5	2.0	2.0	2.5	2.5	1.8	1.9	1.9	1.8	2.2	2.2
15	1.9	2.45	2.0	2.3	2.45	2.5	1.8	1.85	1.9	1.8	2.2	2.2
16	1.85	2.2	2.0	2.3	2.4	1.9	1.8	1.8	1.9	1.8	2.2	2.2
17	2.0	2.2	1.9	2.7	2.45	2.55	1.8	1.75	1.9	1.8	2.2	2.55
18	2.0	2.2	2.0	2.7	2.45	2.5	1.8	1.75	1.9	1.9	2.2	2.2
19	1.9	2.2	2.2	2.65	2.15	2.4	1.8	1.75	1.9	1.9	2.4	2.2
20	1.95	2.15	2.2	2.65	1.8	1.9	1.8	1.7	1.9	1.9	2.4	1.95
21	1.95	2.15	2.2	2.0	2.5	2.6	1.8	1.7	1.9	1.9	1.9	1.95
22	1.9	2.1	2.0	2.6	2.45	2.4	1.9	1.7	1.9	1.9	2.6	2.1
23	1.95	2.1	2.0	2.6	2.5	1.8	2.6	1.7	1.95	1.9	2.4	2.1
24	1.9	2.1	1.9	2.6	2.45	2.0	2.6	1.7	2.0	1.9	2.1	2.7
25	1.9	2.1	1.9	2.6	2.4	2.0	2.6	1.7	2.2	1.9	2.3	1.95
26	1.9	2.1	2.2	2.2	1.8	2.0	2.6	1.8	2.15	1.85	2.3	1.9
27	1.9	2.1	2.2	2.2	2.4	2.0	2.6	1.8	2.15	1.8	2.3	2.2
28	1.9	2.0	2.5	2.3	2.3	2.35	2.1	1.8	2.15	1.8	2.3	2.2
29	1.9	.....	2.5	2.7	2.3	2.3	2.6	1.8	2.2	1.8	2.25	2.2
30	1.9	.....	2.5	2.0	2.6	1.95	2.6	1.8	2.25	1.7	2.2	2.1
31	1.9	.....	2.2	.....	2.0	.....	2.1	1.8	.....	1.7	.....	2.2

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	2.2	2.3	2.1	2.75	2.9	2.35	16	2.1	2.25	2.3	2.8	2.8	2.7
2	2.1	2.3	2.1	2.55	2.4	2.75	17	2.05	2.45	2.3	2.1	2.45	2.3
3	2.05	2.3	2.05	2.55	2.5	2.7	18	2.05	2.15	2.1	2.1	2.1	2.75
4	2.05	2.2	2.0	2.3	2.8	2.7	19	2.05	2.15	2.1	2.1	2.65	2.75
5	2.05	2.0	2.0	2.3	2.75	2.7	20	2.05	2.3	2.1	2.8	2.7	1.95
6	2.1	2.2	2.0	2.75	2.8	2.6	21	2.0	2.3	2.05	2.4	2.5	2.3
7	2.15	2.0	2.0	2.2	2.9	2.3	22	2.0	2.1	2.05	2.8	2.7	1.9
8	2.75	2.0	2.0	2.7	2.8	2.5	23	2.0	2.1	2.05	2.9	2.3	2.0
9	2.15	2.1	2.0	2.05	2.85	2.3	24	2.0	2.1	2.9	2.7	2.7	2.0
10	2.1	2.15	2.0	2.7	2.5	2.75	25	2.0	2.1	2.5	2.7	2.75	1.95
11	2.1	2.0	2.0	2.7	2.8	2.1	26	2.0	2.1	2.7	2.4	2.7	1.9
12	2.1	2.0	2.0	2.4	2.8	2.3	27	2.0	2.2	2.8	2.8	2.15	1.9
13	2.15	2.0	2.0	2.9	2.8	2.7	28	2.05	2.15	2.3	2.3	2.0	1.9
14	2.1	2.0	2.05	2.35	2.8	1.95	29	2.05	2.1	2.7	2.75	1.95	2.75
15	2.1	2.0	2.05	2.7	2.45	2.9	30	2.05	.....	2.6	2.9	2.1	2.75
							31	2.2	.....	.....	.....	2.15	.....

Daily gage height, in feet, of Phillips Lake near East Holden, Me., for 1907–8.

[H. C. Lord, observer.]

Day.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1						8.4						
2		7.9	7.2								6.0	
3								6.8				
4					9.6							
5	7.2									5.9		
6				7.2			7.9					
7									6.1			8.6
8						8.5						
9		7.9	6.8								8.1	
10								6.5				
11					9.0							
12	7.5									6.2		
13				7.7			7.6					
14									6.0			9.0
15						8.4						
16		7.6	6.5								8.4	
17								6.3				
18					8.8							
19	7.6									6.1		
20				8.3			7.4					
21									5.9			9.0
22						8.3						
23		7.5	6.3								8.4	
24								6.2				
25					8.5							
26	7.8									6.0		
27				9.6			7.1					
28									5.7			9.0
29						8.0						
30			6.3								8.6	
31								6.1				

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.[b]							1908.[b]						
1		8.9					16					8.8	
2					8.7		17						
3							18	9.2			8.8		
4	9.1			9.1			19						
5							20						8.1
6						8.7	21			9.0			
7			9.0				22		9.1				
8		8.9					23					8.5	
9					9.0		24						
10							25	8.9			8.7		
11	9.2			8.9			26						
12							27						8.0
13						8.3	28			9.0			
14			8.8				29		9.1				
15		9.0					30					8.4	
							31						

[a] The lake did not freeze over at the gage during 1907. Ice left the lake April 30, 1907. Lake frozen over December 21, 1907.

[b] The lake did not freeze over at the gage during 1908. Ice went out of lake, except from coves, April 22, 1908.

Rating table for Phillips Lake, northern outlet, at East Holden, Me., for 1904–1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.40	1.3	2.20	36.5
1.50	3.6	2.30	42
1.60	7.2	2.40	47.5
1.70	11.3	2.50	53
1.80	15.8	2.60	59
1.90	20.5	2.70	65
2.00	25.5	2.80	71
2.10	31	2.90	77

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 10 discharge measurements made during 1904–1906 and is fairly well defined. Discharges for gage heights 3 feet and over, estimated.

Rating table for Phillips Lake, southeastern outlet, near Lake House railroad station, Maine, for 1904–1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
5.90	0.01	7.70	1.85
6.00	.02	7.80	2.0
6.10	.03	7.90	2.2
6.20	.04	8.00	2.4
6.30	.05	8.10	2.6
6.40	.07	8.20	2.9
6.50	.10	8.30	3.2
6.60	.20	8.40	3.6
6.70	.35	8.50	4.2
6.80	.50	8.60	5.3
6.90	.65	8.70	7.0
7.00	.80	8.80	9.5
7.10	.95	8.90	13
7.20	1.10	9.00	17
7.30	1.25	9.20	29
7.40	1.40	9.40	46
7.50	1.55	9.60	65
7.60	1.70		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 18 discharge measurements made during 1904–1908 and is fairly well defined. It applies to Phillips Lake gage heights.

Monthly discharge of Phillips Lake outlets in Holden and Dedham, Me., for 1907–8.

[Drainage area, 12.3 square miles.]

Month.	Discharge in second-feet.						Run-off (depth in inches on drainage area).
	Northern outlet.			South-eastern outlet.	Total.	Per square mile.	
	Maximum.	Minimum.	Mean.	Mean.			
1907.							
January	53	18.2	22.8	1.58	24.4	1.98	2.28
February	113	20.5	38.5	1.83	40.3	3.28	3.42
March	197	20.5	41.7	.34	42.0	3.41	3.93
April	65	11.3	45.0	16.6	61.6	5.01	5.59
May	59	11.3	42.6	22.0	64.6	5.25	6.05
June	59	15.8	35.7	3.45	39.2	3.19	3.56
July	59	15.8	32.2	1.58	33.8	2.75	3.17
August	31	11.3	20.5	.15	20.6	1.67	1.92
September	39.2	11.3	22.1	.02	22.1	1.80	2.01
October	39.2	11.3	19.8	.02	19.8	1.61	1.86
November	59	11.3	34.9	3.0	37.9	3.08	3.44
December	65	20.5	35.4	13.4	48.8	3.97	4.58
The year	197	11.3	32.6	5.33	37.9	3.08	41.81
1908.							
January	68	25.5	30.7	22.3	53.0	4.31	4.97
February	50.2	25.5	33.3	17.8	51.1	4.15	4.48
March	77	25.5	37.4	16.1	53.5	4.35	5.02
April	77	28.2	56.4	12.3	68.7	5.59	6.24
May	77	23.0	57.5	8.66	66.2	5.38	6.20
June	77	20.5	47.0	3.77	50.8	4.13	4.61

NOTE.—Above values for both stations are classed as D, or approximate, owing to local changes in conditions of flow, which could not be covered by meter measurements.

MISCELLANEOUS MEASUREMENTS IN PENOBSCOT RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in Penobscot River drainage basin during 1908:

Miscellaneous discharge measurements in Penobscot River basin in 1908.

Date.	Stream.	Locality.	Width.	Area of section.	Gage height.	Discharge.
			Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 27	Sousdabscook River	Emersons Mills, Hampden, Me.	67	134	[a] 10.13	359
July 10	do	do	56.5	68.5	[a] 10.99	15.7
Do	do	do	18	9.0	[a] 10.99	14.8
August 11	do	do	24	34	[b] 6.82	17.5
September 8	do	do	57	60	[a] 11.14	10.8
Do	do	do	17	6.2	[a] 11.14	6.9

[a] Bench mark is top of floor of highway bridge, 10 feet from left abutment.
[b] Measurement made 100 feet upstream from remains of old highway bridge in Hampden, from timbers across the stream. Bench mark is on top of a log in cribwork on downstream side of left abutment of bridge.

NOTE.—Gage height is distance from bench mark to water surface.

KENNEBEC RIVER DRAINAGE BASIN.

DESCRIPTION.

Kennebec River rises in Moosehead Lake in the west central part of Maine, the headwaters being collected by Moose River, Roach River, and a number of smaller streams rising in the hilly forested areas east and west of the lake. The drainage basin extends from the Canada line to the ocean. It measures about 150 miles in length, varies in width from 50 to 80 miles in the main portion, and embraces a total area of 5,970 square miles (about one-fifth the total area of the State), of which 1,240 square miles are tributary to Moosehead Lake. The length of the river from the lake to its entrance into Merrymeeting Bay, near Brunswick, including the more considerable windings, is about 140 miles.

The important tributaries of the Kennebec, in the order of their confluence from the source of the river, are as follows:

Tributaries of Kennebec River.

River.	Enters Kennebec at—	Drainage area (square miles).
Moose River	Moosehead Lake	680
Dead River	The Forks	870
Carrabassett River	North Anson	395
Sandy River	Madison	670
Sebasticook River	Winslow	970
Messalonskee Stream	Waterville	210
Cobbosseecontee Stream	Gardiner	240

The northern part of the drainage basin is broken by offsets from the White Mountains. Near Moosehead Lake the hills and highlands lie well back from the lake, leaving a great open plain. Below the lake nearly to The Forks the river is a torrent, flowing in a narrow, rocky chasm with precipitous sides. Below the junction of Dead River at The Forks the Kennebec flows through a broader valley with gentler slopes. The general elevation of the basin is less than that of the Androscoggin, which adjoins it on the west, although near the center of the area Saddleback, Abraham, and Bigelow mountains rise as isolated peaks to an elevation higher than any mountains in the State except Katahdin. The extreme headwaters of the Kennebec at the Canadian line reach an elevation of approximately 2,000 feet. Moosehead Lake is about 1,026 feet above tide water and distant from it 120 miles, corresponding to an average descent of 8.55 feet per mile.

The Kennebec basin presents considerable variety in its rock formations. In the northern part of the basin the rocks are mostly sedimentary, including sandstones, conglomerates, shales, slates, and

impure limestones. A few masses of igneous rocks are found, notably the rhyolite of Mount Kineo. In the central and southern portions of the basin extensive areas of granite appear, and in general the tendency is toward metamorphic rocks. The quarries at Hallowell are located on one of the larger masses of pure granite. A notable characteristic of the rocks in the Kennebec basin is their compactness and hardness, which gives a permanence to the present channels of the river. The surface materials are usually finely pulverized, and water-retaining sands and gravels are more abundant in the northern part, succeeded by a greater proportion of loam and clay to the southward.

The greater part of the Kennebec River drainage basin is in forest cover, and the upper portion is heavily timbered, although extensive cutting has been going on for many years. Spruce is most abundant, and large quantities of poplar, valuable in the production of the best grades of paper, are found. About one-third of all the lumber used in the State for pulp and paper comes from the Kennebec basin.

The mean annual precipitation in the Kennebec basin above Waterville is about 40 inches. It varies from a little over 44 inches at Gardiner to probably not over 35 inches in the extreme northwestern part of the basin.

The river is generally frozen over during the winter, and the accumulations of snow in the northern portions of the basin frequently reach a depth of 3 feet, with a water equivalent of 5 or 6 inches.

The natural storage facilities on the Kennebec basin are excellent, there being about 420 square miles of lake and pond surface. Moosehead Lake, with an area of about 115 square miles, is the largest lake in New England. It is about 35 miles in extreme length, 12 miles in maximum width, and of such depth that it is crossed by steamboats from end to end. It has been in use many years as a reservoir to store the spring flow for use in log driving and for power and is commanded by substantial log-crib dams at its two outlets. The east outlet stream is the most important and is joined by the west outlet stream at the upper end of Indian Pond, about 4 miles below the lake.

The present head of water at Moosehead Lake is about 7.5 feet, corresponding to about 23.5 billion cubic feet storage, but surveys and estimates have been made by the Kennebec Water Power Company covering an additional depth of 2 feet, corresponding to approximately 1.6 square miles of additional water area. Considerable damage to property at Greenville and Kineo would occur by this change, but an additional storage capacity of about 6.5 billion cubic feet would result. The lake could also be drawn down to a lower level by dredging at the outlet, which, however, would doubtless be objected to by the navigation interests.

Other important storage basins in Kennebec headwaters, little used at present, are Brassua Lake, Long, Wood, Attean, and the Roach ponds. Economical storage in the headwaters up to 40 billion cubic feet capacity is possible, which with that on Dead River and other tributaries should make the Kennebec River, with its large amount of fall, one of the best power streams in the country.

While the regimen of flow of the Kennebec has been much improved by storage in Moosehead Lake, a systematic regulation of the use of stored water is greatly needed, for much of the stored water impounded by the lake at the present time is needlessly wasted during log driving and at other times for lack of an adequate system of measuring and recording the flow from the outlets.

The Kennebec River has always been an important river for log driving, the annual drive at present amounting to about 150 million feet b. m.

Below Skowhegan practically all of the fall is utilized for power, but above this point there is a large amount of unutilized power. About 40 feet of fall in the vicinity of Madison is being developed by the Hollingsworth & Whitney Company for a pulp and paper mill. Some of the important industries using water power on the main river are the cotton mills at Augusta and Waterville, the pulp and paper mills at Waterville, Skowhegan, Madison, and Solon, and numerous lumber mills.

The longest continuous run-off record on the main river is that at Waterville, beginning in 1893. The driest year since that time was 1908, and the wettest was 1907, the total flow in these two years being in the ratio of about 1 to 2.32.

The following gaging stations have been maintained in this basin:

Moose River at Rockwood (1902–1908).
Moosehead Lake at Greenville (1903–1908; stage only).
Moosehead Lake at East Outlet (1895–1908; stage only).
Kennebec River at The Forks (1901–1908).
Kennebec River at Bingham (1907–8).
Kennebec River at North Anson (1901–1907).
Kennebec River at Waterville (1891–1908).
Roach River at Roach River (1901–1908).
Dead River at The Forks (1901–1907).
Carrabassett River at North Anson (1901–1907).
Sandy River at Madison (1904–1908).
Sebasticook River at Pittsfield (1908).
Messalonskee Stream at Waterville (1903–1905).
Cobbosseecontee Stream at Gardiner (1890–1908).

All available data pertaining to the Kennebec River drainage basin collected prior to 1907 have been assembled and published in Water-Supply Paper 198, Water resources of Kennebec River basin.

RIVER SURVEYS IN KENNEBEC DRAINAGE BASIN.

In order to point out the power and storage possibilities in the Kennebec basin, surveys have been made as follows:

From tide water to Moosehead Lake, for the determination of the profile and plan of the river.

Moose River from Moosehead Lake to near Long Pond.

Surveys of Wood and Attean ponds and Brassua Lake, to determine their storage capacity.

Surveys of Holeb, Long, Lower and Middle Roach, West Carry, and Spencer ponds, and Flagstaff and Spring lakes, to determine their areas.

From the data collected by the river surveys sheets have been prepared, showing as far as available the profile of water surface, plan of the river, contours along the banks, and prominent natural or artificial features.

From the lake surveys sheets have been prepared, showing as far as possible the shore lines and bank contours, covering from 10 to 20 feet depth of storage.

The results of these surveys have been published on sheets, and may be had on application to the Director of the Geological Survey.

MOOSE RIVER NEAR ROCKWOOD, ME.

Moose River, the largest stream tributary to Moosehead Lake, rises in the extreme northern part of Franklin County, flows in a direction a little north of east, and enters the lake from the west. The river passes through Attean, Wood, and Long ponds and Brassua Lake, and receives the drainage from a large number of small ponds well scattered over the basin. Dams are maintained at the outlets of several of the lakes and ponds, but all of such stored water is used for log driving, and the effect upon the regimen of flow is but temporary. The flow is not subject to violent fluctuations. There is considerable fall to the river—about 150 feet—entirely undeveloped.

The gaging station was established September 7, 1902, to obtain general statistical data regarding the total flow of the stream, and was discontinued December 31, 1908. It was located 4 miles west of Kineo, near the village of Rockwood, and 2 miles from the mouth of the river.

The gage datum remained the same during the maintenance of the station. Discharge during the winter months is affected by ice. Conditions for obtaining accurate discharge data are good, and a good rating curve has been developed except for extreme low stages, where it is somewhat uncertain. Data prior to 1907 have been compiled in Water-Supply Paper 198.

The following measurement was made September 26, 1908: Width, 150 feet; area, 262 square feet; gage height, 1.48 feet; discharge, 71.2 second-feet.

Daily gage height, in feet, of Moose River near Rockwood, Me., for 1907–8.

[Peter Callaghan and John King, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	2.5	.....	.....	2.35	6.4	6.05	5.6	4.35	2.5	3.15	5.4	5.9
2	2.5	2.9	2.2	2.5	6.8	5.8	5.4	4.3	2.5	3.2	5.7	5.9
3	2.5	.....	.....	2.5	7.2	5.6	5.3	4.25	2.55	3.3	5.9	5.8
4	2.5	.....	.....	2.5	7.4	5.4	4.75	4.2	2.5	3.4	6.0	5.8
5	2.5	.....	.....	2.6	7.7	5.2	4.3	4.2	2.6	3.4	6.2	5.8
6	2.5	.....	.....	2.6	7.8	5.0	4.05	4.1	2.6	3.45	6.4	5.9
7	.....	.....	.....	2.6	7.9	5.1	3.95	4.1	2.5	3.5	6.6	5.9
8	.....	.....	.....	2.8	8.2	5.1	3.9	4.35	2.5	3.65	6.7	6.0
9	.....	2.8	1.9	2.8	8.2	5.0	4.0	4.45	2.5	3.9	6.9	6.0
10	.....	.....	.....	2.85	8.3	4.95	4.05	4.5	2.5	4.05	7.0	6.0
11	.....	.....	.....	2.85	8.3	4.85	4.0	4.35	2.5	4.2	7.1	6.2
12	2.5	.....	.....	2.95	8.4	4.85	4.2	4.25	2.55	4.2	7.2	6.3
13	2.5	.....	.....	3.05	8.4	4.85	4.95	4.05	2.5	4.3	7.2	6.3
14	.....	.....	.....	3.1	8.4	4.75	5.25	3.85	2.5	4.2	7.1	6.3
15	.....	.....	.....	.....	8.4	4.7	5.25	3.75	2.4	4.2	7.0	6.4
16	.....	2.4	1.9	.....	8.15	4.5	5.15	3.65	2.4	4.2	6.9	6.4
17	.....	.....	.....	.....	7.9	4.35	4.95	3.55	2.6	4.15	6.7	6.4
18	.....	.....	.....	.....	7.65	4.15	4.75	3.5	2.7	4.1	6.6	6.4
19	2.7	.....	.....	.....	7.5	4.1	4.55	3.4	2.8	4.05	6.4	6.4
20	2.7	.....	.....	.....	7.45	4.05	4.35	3.35	2.8	3.95	6.3	6.5
21	.....	.....	.....	.....	7.65	4.15	4.1	3.3	2.65	3.75	6.2	6.5
22	.....	.....	.....	.....	7.9	4.4	4.05	3.2	2.65	3.85	6.1	6.5
23	.....	2.4	1.9	.....	7.95	4.6	4.05	3.1	2.6	4.2	5.0	6.0
24	.....	.....	.....	.....	7.85	4.7	3.95	3.0	2.8	4.2	5.7	6.05
25	.....	.....	.....	.....	7.55	4.7	3.9	3.0	2.85	4.4	5.8	5.6
26	2.8	.....	.....	5.25	7.4	4.7	3.9	2.9	2.85	4.6	5.8	5.6
27	.....	.....	.....	5.75	7.3	4.85	3.95	2.8	2.85	4.7	5.8	5.6
28	.....	.....	.....	5.8	7.1	5.15	3.95	2.75	2.9	4.9	5.8	5.6
29	.....	.....	.....	5.9	6.85	5.35	4.05	2.7	2.95	5.0	5.85	5.5
30	.....	.....	2.1	6.2	6.5	5.6	4.15	2.6	3.0	5.2	5.9	4.95
31	.....	.....	.....	.....	6.3	.....	4.25	2.55	.....	5.3	.....	4.55
1908.[b]												
1	.....	.....	2.8	3.6	9.1	6.65	3.2	1.9	1.9	1.6	2.0	1.5
2	.....	.....	2.8	3.6	9.2	6.5	3.1	1.9	1.9	1.75	1.9	1.5
3	.....	.....	2.7	3.7	9.1	6.35	2.9	1.9	1.9	1.8	1.9	1.5
4	.....	.....	2.7	3.7	8.8	6.15	2.8	1.9	1.9	1.6	1.8	1.5
5	.....	.....	2.6	3.7	8.8	5.9	2.7	1.9	1.9	1.7	1.7	1.5
6	.....	.....	2.6	3.8	8.7	5.7	2.7	1.9	1.9	1.8	1.7	1.6
7	.....	.....	2.6	3.8	8.6	5.65	2.6	1.9	1.9	1.9	1.7	1.6
8	.....	.....	2.5	3.8	8.6	6.0	2.6	1.9	1.9	1.9	1.6	1.8
9	.....	.....	2.5	3.9	8.6	5.9	2.5	1.9	1.9	1.9	1.6	1.8
10	.....	.....	2.6	3.9	8.65	5.8	2.5	1.8	1.9	2.0	1.6	1.9
11	.....	.....	2.6	4.0	8.6	6.0	2.5	1.9	1.9	2.1	1.7	2.0
12	.....	.....	2.5	4.0	8.4	6.4	2.5	1.9	1.9	2.1	1.7	2.0
13	.....	.....	2.5	4.1	8.2	6.2	2.2	1.9	1.9	2.2	1.7	2.0
14	.....	.....	2.5	4.2	8.1	6.0	2.2	1.9	1.9	1.9	1.8	2.0
15	.....	.....	2.5	4.3	7.0	5.95	2.1	1.9	1.9	1.8	1.7	1.9
16	.....	.....	2.5	4.3	7.2	5.8	2.0	1.9	1.9	1.8	1.7	1.9
17	.....	.....	2.6	4.4	7.3	5.55	2.0	1.9	1.8	1.8	1.6	2.0
18	.....	.....	2.6	4.5	7.1	5.3	2.0	2.0	1.8	1.8	1.6	2.0
19	.....	.....	2.6	4.5	6.9	5.0	2.0	2.0	1.8	1.7	1.6	2.0
20	.....	.....	2.5	4.65	6.7	4.7	2.0	2.0	.....	1.7	1.6	2.0
21	.....	.....	2.5	4.8	6.5	4.0	2.0	2.0	.....	1.8	1.6	2.0
22	.....	.....	2.85	4.9	6.2	3.0	2.0	2.0	.....	1.8	1.6	2.0
23	.....	.....	2.95	5.0	6.0	3.2	2.0	2.0	.....	1.7	1.5	2.0
24	.....	.....	3.1	5.3	6.1	3.4	2.0	2.0	.....	1.7	1.5	2.0
25	.....	2.9	3.2	5.3	6.2	3.55	2.0	2.0	.....	1.8	1.6	2.0
26	.....	2.8	3.3	5.95	6.5	3.6	2.0	2.0	1.5	1.8	1.6	2.0
27	.....	2.8	3.4	6.9	6.6	3.6	1.9	2.0	1.5	1.9	1.5	2.0
28	.....	2.7	3.5	7.75	6.55	3.4	1.9	2.0	1.5	1.9	1.5	2.1
29	.....	2.7	3.5	8.75	6.7	3.2	1.9	2.0	1.75	1.9	1.5	2.2
30	.....	.....	3.5	9.0	6.65	.....	1.9	1.95	1.6	2.0	1.5	2.3
31	.....	.....	3.6	.....	.....	.....	1.9	1.9	.....	2.0	.....	2.4

[a] Discharge affected by ice conditions during January and February, 1907. Conditions during March doubtful. It is probable, however, that the river was open. Ice conditions during the frozen seasons 1907–8 are to water surface in a hole cut in the ice.

[b] Ice conditions probably prevailed during the first half of February and from about December 6 to 31, 1908.

Rating table for Moose River near Rockwood, Me., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	93	3.00	631	4.40	1,538	6.60	3,670
1.60	120	3.10	681	4.50	1,620	6.80	3,890
1.70	148	3.20	733	4.60	1,703	7.00	4,110
1.80	177	3.30	788	4.70	1,788	7.20	4,340
1.90	207	3.40	846	4.80	1,875	7.40	4,570
2.00	238	3.50	906	4.90	1,964	7.60	4,800
2.10	270	3.60	968	5.00	2,055	7.80	5,035
2.20	303	3.70	1,032	5.20	2,240	8.00	5,275
2.30	338	3.80	1,098	5.40	2,432	8.20	5,515
2.40	375	3.90	1,166	5.60	2,629	8.40	5,755
2.50	414	4.00	1,236	5.80	2,830	8.60	6,000
2.60	454	4.10	1,308	6.00	3,035	8.80	6,250
2.70	496	4.20	1,382	6.20	3,245	9.00	6,500
2.80	539	4.30	1,459	6.40	3,455	9.20	6,750
2.90	584						

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1902–1908, and is well defined between gage heights 2 feet and 7 feet.

Monthly discharge of Moose River near Rockwood, Me., for 1907–8.

[Drainage area, 680 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	.....	300	0.441	0.51	D.
February	.....	.....	150	.221	.23	D.
March	.....	.....	233	.343	.40	D.
April	3,240	356	1,030	1.51	1.68	B.
May	5,760	3,350	4,860	7.15	8.24	A.
June	3,090	1,270	1,970	2.90	3.24	A.
July	2,630	1,170	1,580	2.32	2.68	A.
August	1,620	434	1,030	1.51	1.74	A.
September	631	375	472	.694	.77	A.
October	2,340	707	1,330	1.96	2.26	A.
November	4,340	2,060	3,370	4.96	5.53	A.
December	.....	.....	1,500	2.21	2.55	D.
The year	5,760	.....	1,490	2.18	29.83	
1908.						
January	.....	.....	800	1.18	1.36	D.
February	.....	.....	400	.588	.63	D.
March	968	414	559	.822	.95	B.
April	6,500	968	2,020	2.97	3.31	A.
May	6,750	3,040	4,790	7.04	8.12	A.
June	3,720	631	2,230	3.28	3.66	A.
July	733	207	343	.504	.58	A.
August	238	177	219	.322	.37	A.
September	207	93	174	.256	.29	A.
October	303	120	191	.281	.32	A.
November	238	93	136	.200	.22	A.
December	.....	.....	100	.147	.17	D.
The year	6,750	.....	997	1.47	19.98	

NOTE.—Discharge January to March and December, 1907, based on a study of discharge at all stations in the Kennebec River basin, and the effect of storage at Moosehead Lake. Discharge April 15 to 25, 1907, based on the discharge of Dead River. Discharge January, February, and December, 1908, based on the natural flow of Kennebec at The Forks.

	Second-feet.
Discharge April 15 to 25, 1907	873
February 1 to 24, 1908	373
December 6 to 31, 1908	101

MOOSEHEAD LAKE AT EAST OUTLET, MAINE.

A record of gage heights of Moosehead Lake level at Moosehead Lake East Outlet has been kept since April, 1895, by the Hollingsworth & Whitney Company. This record, supplemented by gage readings at Greenville for a portion of the time, has been furnished for publication by the company. (See description of Kennebec River basin, p. 74.)

Two gage datums have been used at the East Outlet: The first is at elevation 1011.30 feet above mean sea level, and approximately 10 feet below the gate sills; the other is 10 feet higher, i. e., the zero at the sill of the gates. All gage readings refer to this latter datum.

The maximum gage height recorded since the beginning of the records occurred May 9 and 30, 1902, and was 8 feet. The lowest gage height recorded, except September 28, 1895, when the stage was 0.1 foot, was 0.15 on December 4, 1903, although from this time until April 29, 1904, no gage readings were obtained, the water being below the bottom of the gage. The extreme range of lake level at present is thus about 8 feet.

Gage readings prior to 1907 have been compiled in Water Supply Paper 198.

Dates of closing and opening of Moosehead Lake.

Closed.	Opened.
December 2, 1906	May 14, 1907
December 2, 1907	May 11, 1908
December 5, 1908	May 15, 1909

Daily gage height, in feet, of Moosehead Lake at East Outlet, Me., for 1907–8.

[C. E. Wilson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1		3.25	2.4	1.7	4.5		7.5				6.8	
2	3.4							7.2		5.7		7.1
3				1.75	5.1	7.4	7.5					
4	3.5	3.25	2.3						6.1	5.9	7.25	7.0
5				1.8		7.45	7.4	7.25			7.4	
6		3.2	2.15		6.0				6.05			6.95
7	3.45					7.45	7.1	7.2	5.85	5.9		
8		3.2	1.95	2.0	6.45		7.3				7.65	
9	3.4							7.45		5.95		6.83
10				2.1	6.75	7.4	7.2					
11	3.4	3.15	1.9						5.9	6.1	7.48	7.0
12				2.25		7.4		7.45				
13		3.1	1.85		7.3						7.3	7.2
14	3.4					7.1		7.35		6.25		
15		3.0	1.75	2.35	7.35		7.1		5.85		7.25	
16	3.35							7.4		6.2		7.2
17					7.4	7.1						
18	3.35		1.7				7.05		5.75	6.4	7.45	
19				2.6		7.0						
20		2.9	1.6		7.5				5.75		7.45	7.4
21	3.3					6.95		7.1		6.4		
22		2.85	1.6	2.75	7.55		7.15				7.45	
23	3.25							6.9	5.7	6.3		7.4
24				3.0		6.9	7.05					
25		2.75	1.6						5.75	6.35	7.4	7.45
26				3.25		6.95		6.65			7.4	
27		2.6	1.6	3.8	7.55		7.05		5.75		7.3	7.3
28	3.2					7.3					7.3	
29			1.6		7.6		7.1				7.2	
30	3.2							6.35	5.7	6.7		
31					7.5		7.2					7.4
1908.												
1					6.5	7.75	6.6					
2	7.4		6.25	4.65	7.15				3.1	1.85		0.7
3		6.9		4.50		7.6		4.5				
4	7.4		6.3		7.25				3.5		0.85	.6
5		6.85				7.5		4.4				
6			6.2	4.45						1.8	.8	
7	7.4	6.8						4.3	2.95			.6
8				4.5	7.25	7.45	6.2					
9	7.4		6.1							1.75	.7	
10	7.35	6.7		4.55		7.3	6.0	4.1				
11			6.0		7.1	7.2			2.65		.8	.5
12				4.35			5.9	4.1		1.6		
13	7.35		5.8		7.4							
14		6.45					5.8	4.0	2.5	1.6		.5
15	7.35			4.55	7.55	7.2						
16			5.6				5.6		2.4	1.5		.45
17	7.35	6.4		4.6		7.2	5.4	3.95				
18			5.4		7.6				2.4		.7	.45
19		6.35				7.3		3.85				
20	7.2		5.4	4.7	7.55		5.3				.7	
21		6.4						3.75	2.2	1.3		.5
22	7.1			4.85	7.5		5.1					
23						7.15			2.1	1.3		.5
24		6.4	5.1	4.95		7.1	5.05	3.6				
25	7.0		4.95						2.05		.6	.5
26		6.3			7.45	6.9		3.5		1.2		
27	6.95		4.85	5.2	7.45		4.9		2.0		.7	
28	7.0	6.3						3.4				.45
29					7.55	6.7	4.8					
30			4.75	6.2					1.9	1.05	.7	.45
31	7.0						4.7	3.3				

KENNEBEC RIVER AT THE FORKS, ME.

This station is located at the wooden highway bridge across Kennebec River at The Forks, about 2,000 feet above the mouth of Dead River. It was established September 28, 1901, to obtain general statistical and comparative data regarding the flow of the Kennebec.

The nearest dam used for storage is about 12 miles above the station, at the outlet of Indian Pond. From about May 1 to July 31 considerable fluctuation in gage height, ranging from 2 to over 5 feet, occurs daily, owing to regulation of flow for log driving.

The gage datum has remained the same during the maintenance of the station. Its elevation above mean sea level, revised July, 1906, is 565.44 feet. During the winter months the discharge is affected by the ice. Conditions for obtaining accurate discharge data are fairly good, except for occasional backwater effect from Dead River, and a good rating curve has been developed for medium and low stages.

Data prior to 1907 have been revised and compiled in Water Supply Paper 198.

Discharge measurements of Kennebec River at The Forks, Me., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.[a]	Gage height.[b]	Discharge.	Thickness of ice.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*	*Feet.*
February 20	F. E. Pressey	158	705	5.11	5.31	2,110	2.8
Do	do	158	715	5.08	5.28	2,060	2.8
March 17	do	120	666	4.50	4.70	1,450	3.0
Do	do	120	692	4.51	4.71	1,470	3.0
September 17	do	123	731	2.34	.....	1,600	.....
1908.							
March 25	F. E. Pressey	133	956	4.10	.....	3,900	.....
September 24	do	123	679	1.91	.....	1,290	.....
November 6	Wood and French	122	613	1.04	.....	658	.....
December 17 [c]	F. E. Pressey	118	576	2.05	2.15	409	.88

[a] To water surface. [b] To top of ice. [c] Considerable anchor ice.

Daily gage height, in feet, of Kennebec River at The Forks, Me., for 1907–8.

[William W. Young, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	2.3	.....	1.40	5.85	5.35	4.8	3.70	3.70	1.55	2.40	3.70
2	.....	.....	4.6	1.3	6.05	5.4	5.3	3.55	3.5	1.6	2.1	3.4
3	.....	.....	.....	1.1	5.6	5.7	5.6	3.5	3.5	1.6	3.1	3.1
4	.....	.....	.....	1.3	5.1	4.5	5.75	3.4	3.3	1.3	4.3	3.7
5	2.7	.....	.....	1.3	4.5	4.85	5.7	3.25	3.1	2.0	4.15	3.7
6	.....	.....	.....	1.4	4.35	6.0	3.95	3.5	3.1	1.7	3.7	3.8
7	.....	.....	.....	1.4	3.65	5.6	4.05	3.55	3.0	1.6	4.85	3.5
8	.....	2.3	.....	1.4	3.8	4.7	4.3	3.45	3.0	1.7	6.35	2.75
9	.....	.....	4.8	1.4	3.95	4.35	4.35	3.3	3.0	1.85	8.5	3.45
10	.....	.....	.....	1.4	4.6	4.4	4.0	4.4	2.6	1.75	7.55	3.2
11	.....	.....	.....	1.5	4.4	4.5	3.8	3.25	2.2	1.7	7.35	3.65
12	2.8	.....	.....	1.5	5.7	4.5	4.4	4.75	2.7	1.7	7.25	3.35
13	.....	.....	.....	1.5	6.45	4.4	2.85	4.55	2.7	1.65	7.1	3.2
14	.....	.....	.....	1.5	7.0	4.15	2.3	4.0	2.7	1.7	6.85	2.65
15	.....	.....	.....	1.5	6.85	4.05	2.1	3.55	2.7	1.6	4.55	2.4
16	.....	2.5	4.5	1.5	6.9	3.95	2.1	3.55	2.65	1.5	2.75	2.25
17	.....	.....	4.5	1.5	5.35	3.05	1.9	3.7	2.3	1.45	1.55	2.2
18	.....	.....	4.5	1.5	6.45	3.6	1.85	3.65	2.2	1.35	1.4	1.5
19	2.9	.....	5.1	1.4	7.1	3.85	1.8	3.35	2.2	1.3	3.25	2.9
20	.....	5.1	.....	1.4	6.65	3.9	3.6	3.4	1.9	1.3	3.4	3.0
21	.....	.....	.....	1.4	7.3	3.75	3.55	3.75	2.05	1.3	3.4	2.9
22	.....	.....	.....	1.4	6.8	4.0	1.7	3.75	2.35	1.75	3.4	2.45
23	.....	.....	4.3	1.4	5.2	4.0	3.3	3.75	2.4	1.8	4.15	2.25
24	.....	4.5	.....	2.25	5.5	3.8	3.75	3.65	2.5	2.1	4.4	3.6
25	.....	.....	.....	3.55	5.9	4.0	3.65	4.1	2.0	2.1	4.15	4.65
26	.....	.....	.....	3.7	5.25	4.1	3.6	3.8	1.9	2.1	4.3	4.5
27	.....	.....	.....	3.7	5.0	5.05	4.2	3.8	1.55	2.1	4.3	3.5
28	.....	.....	.....	3.75	5.25	3.4	4.1	3.6	1.35	2.25	4.3	2.25
29	.....	.....	.....	4.3	5.85	3.15	3.6	3.7	1.35	2.95	4.1	2.65
30	.....	.....	2.0	5.2	6.2	4.0	3.65	3.75	1.7	2.9	3.95	2.6
31	.....	.....	.....	.....	5.85	.....	3.75	3.8	.....	2.65	.....	2.55
1908.[b]												
1	2.70	2.85	3.0	4.0	5.9	6.8	3.5	3.3	2.55	2.0	1.15	0.9
2	2.65	2.9	2.9	3.8	6.2	7.0	3.5	5.3	2.5	2.05	1.15	.9
3	3.05	3.05	2.9	3.8	5.7	7.15	3.45	5.0	2.5	1.95	1.15	.9
4	3.0	3.15	3.3	3.8	5.35	7.2	3.45	5.0	2.5	1.8	1.1	.9
5	3.0	3.4	3.3	3.8	7.15	6.5	3.45	3.2	2.4	1.65	1.0	1.5
6	3.0	3.5	3.3	3.7	8.3	5.05	3.55	3.2	2.4	1.6	1.0	.....
7	3.0	3.5	3.4	2.5	7.65	5.65	3.6	4.65	2.35	1.5	1.0	.....
8	3.0	3.75	3.4	2.2	8.25	5.35	3.6	3.0	2.3	1.45	.9	.....
9	2.8	3.8	3.9	2.2	8.15	4.65	3.55	2.5	2.4	1.4	.9	2.0
10	2.8	3.85	3.9	2.7	8.25	5.3	3.6	2.5	2.45	1.4	.9	.....
11	2.8	4.15	3.8	2.9	8.1	4.9	3.55	2.5	2.4	1.45	1.0	.....
12	2.8	4.1	3.9	2.9	7.05	3.9	3.4	3.0	2.4	1.5	1.0	.....
13	2.8	4.0	3.9	3.0	4.6	3.85	3.3	3.2	2.3	1.5	.9	.....
14	2.8	3.9	4.0	3.4	4.6	3.8	3.3	3.2	2.3	1.5	.9	.....
15	2.8	3.7	4.1	3.3	5.1	3.9	3.3	3.1	2.3	1.5	.9	.....
16	2.8	3.7	4.0	3.3	5.7	4.75	1.3	3.1	2.3	1.5	.9	2.1
17	2.9	2.5	3.9	2.3	5.9	4.25	3.35	3.1	2.3	1.5	.9	.....
18	2.9	2.5	3.8	2.0	6.65	4.55	3.35	3.0	2.3	1.5	.9	.....
19	3.8	2.5	3.8	1.7	6.15	4.95	3.35	3.0	2.1	1.4	.9	2.1
20	3.8	2.5	3.8	1.4	6.3	5.05	3.35	3.0	2.1	1.35	.9	.....
21	3.8	2.5	3.7	1.4	6.7	5.05	3.35	2.95	2.1	1.3	.8	.....
22	3.7	2.4	3.7	1.3	6.4	5.05	3.3	2.9	2.0	1.3	.8	.....
23	3.4	2.4	4.1	1.4	5.85	4.75	3.3	2.9	2.0	1.2	.8	1.9
24	3.2	2.4	4.1	2.1	6.0	4.95	3.3	2.65	2.0	1.25	.8	.....
25	3.0	2.4	4.1	2.55	5.8	5.55	3.25	2.55	1.95	1.1	.8	.....
26	3.0	2.65	4.1	3.15	5.8	4.65	3.25	2.5	1.9	1.2	.8	2.0
27	3.0	3.0	4.0	4.8	5.6	4.6	3.25	2.5	1.9	1.25	.9	.....
28	2.0	3.0	4.0	5.85	5.05	4.75	1.4	2.4	2.0	1.25	.9	.....
29	2.0	3.0	4.0	5.85	5.55	3.65	3.35	2.5	2.15	1.25	.9	1.9
30	2.3	.....	4.0	5.45	5.55	3.6	3.35	2.5	2.0	1.25	.9	.....
31	2.8	.....	4.0	.....	6.5	.....	3.35	2.6	.....	1.25	.....	.....

[a] Ice conditions during January, February, and March, 1907.

[b] Ice conditions from about January 31 to February 16 and about March 4 to 31, 1908; also about December 5 to 31, 1908. During the frozen seasons 1907–8 gage readings were taken to water surface in a hole cut in the ice.

Rating table for Kennebec River at The Forks, Me., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	520	2.10	1,405	3.40	3,100	5.40	7,590
.90	565	2.20	1,495	3.50	3,270	5.60	8,145
1.00	615	2.30	1,590	3.60	3,450	5.80	8,720
1.10	670	2.40	1,700	3.70	3,635	6.00	9,315
1.20	730	2.50	1,815	3.80	3,825	6.20	9,930
1.30	795	2.60	1,935	3.90	4,020	6.40	10,550
1.40	860	2.70	2,060	4.00	4,220	6.60	11,190
1.50	930	2.80	2,190	4.20	4,635	6.80	11,850
1.60	1,000	2.90	2,325	4.40	5,070	7.00	12,520
1.70	1,075	3.00	2,470	4.60	5,535	8.00	16,070
1.80	1,155	3.10	2,620	4.80	6,020	9.00	19,890
1.90	1,235	3.20	2,775	5.00	6,525		
2.00	1,320	3.30	2,935	5.20	7,050		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1901–1908 and is well defined below gage height 5 feet. Above gage height 5 feet it may give somewhat too large discharge.

Monthly discharge of Kennebec River at The Forks, Me., for 1907–8.

[Drainage area, 1,570 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	.....	920	0.586	0.68	D.
February	.....	.....	1,260	.803	.84	D.
March	.....	.....	1,620	1.03	1.19	D.
April	7,050	670	1,570	1.00	1.12	B.
May	13,600	3,540	8,440	5.38	6.20	B.
June	9,320	2,540	5,070	3.23	3.60	B.
July	8,580	1,080	3,920	2.50	2.88	B.
August	5,900	2,860	3,670	2.34	2.70	C.
September	3,640	828	1,940	1.24	1.38	B.
October	2,400	795	1,190	.758	.87	A.
November	18,000	860	5,950	3.79	4.23	A.
December	5,660	930	2,720	1.73	1.99	A.
The year	18,000	.....	3,190	2.03	27.68	
1908.						
January	3,820	1,320	2,450	1.56	1.80	B.
February	.....	.....	2,030	1.29	1.39	B.
March	.....	.....	3,090	1.97	2.27	B.
April	8,870	800	3,030	1.93	2.15	A.
May	17,200	5,540	10,500	6.69	7.71	B.
June	13,200	3,450	6,860	4.37	4.88	C.
July	3,450	795	2,960	1.89	2.18	C.
August	7,320	1,700	2,830	1.80	2.08	D.
September	1,880	1,240	1,550	.987	1.10	A.
October	1,360	670	906	.577	.67	A.
November	700	520	581	.379	.41	A.
December	.....	.....	451	.287	.33	C.
The year	17,200	.....	3,100	1.98	26.97	

NOTE.—Discharge during the frozen period, 1907, based on the discharge at North Anson, and a study of storage conditions at Moosehead Lake, and during 1908 on a study of storage conditions at Moosehead Lake.

	Second-feet.
Discharge, February 1 to 16, 1908	2,100
March 4 to 31, 1908	3,170
December 5 to 31, 1908	435

The relatively low accuracy values from May to August for 1907 and 1908 are due to errors in computed discharge caused by controlled flow for flushing logs down the river and backwater from log jams. The discharge is probably too high for most of these months, and particularly so for August, 1908.

KENNEBEC RIVER AT BINGHAM, ME.

This station, which is located at the new steel highway bridge across Kennebec River at Bingham, was established June 21, 1907, to obtain general statistical and comparative data regarding the flow of the Kennebec. It is located just below the mouth of Austin Stream. The nearest dam is about 11 miles downstream at Solon, but the station is above the influence of backwater. The drainage area at this point is 2,670 square miles.

The datum of the gage has remained the same during the maintenance of the station. During the winter months discharge is affected by the ice. Conditions for obtaining accurate discharge data are good, but no rating table has been published because of the few discharge measurements made up to this time.

This station was established to replace the stations at North Anson on the Kennebec and The Forks on Dead River. In connection with the other stations in this drainage basin the records of discharge will afford a basis for an estimate of water for power and storage flowing in the Kennebec at any point.

Discharge measurements of Kennebec River at Bingham, Me., in 1906–1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.[a]	Gage height.[b]	Thickness of ice.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Feet.*	*Feet.*	*Sec.-ft.*
1906.							
September 6	F. E. Pressey	419	1,680	3.14	.....	.....	2,670
1907.							
March 19[c d]	F. E. Pressey	402	1,500	5.79	5.79	2.80	2,650
Do.[c d]	do	402	1,480	5.79	5.79	2.80	2,420
June 23	do	437	2,620	4.85	.....	.....	7,550
September 18	do	423	1,740	3.21	.....	.....	2,600
1908.							
March 26[d]	F. E. Pressey	530	3,800	9.73	10.03	2.60	5,200
September 23	do	406	1,580	2.52	.....	.....	1,490
November 5	Wood and French	396	1,420	2.18	.....	.....	797
December 15[d]	F. E. Pressey	402	1,400	3.00	3.10	.88	805
1909.							
April 23	F. E. Pressey	444	3,120	6.03	.....	.....	13,200
May 19	do	461	3,940	7.37	.....	.....	23,200

[a] To water surface.
[b] To top of ice.
[c] Gates open in dams at Pierce and Moxie ponds.
[d] Anchor ice.

Daily gage height, in feet, of Kennebec River at Bingham, Me., for 1907–8.

[C. R. Ellis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1							5.2	4.3	3.75	3.5	4.3	4.1
2							5.95	4.2	3.65	3.7	4.0	3.9
3							5.45	4.05	3.6	3.5	4.7	4.0
4							5.35	3.95	3.7	3.3	6.0	4.1
5							5.0	4.05	3.85	3.6	6.1	4.1
6							4.75	4.05	3.7	3.7	5.5	4.1
7							4.3	4.05	3.7	3.5	6.75	3.9
8							4.25	4.05	3.4	3.4	7.75	3.7
9							4.6	4.1	3.4	4.0	8.2	3.6
10							4.35	4.05	3.2	4.1	7.7	3.7
11							4.35	3.75	3.1	3.9	7.1	5.1
12							4.5	3.95	3.6	3.9	6.8	5.4
13							4.35	4.05	3.7	3.7	6.5	5.0
14							4.55	3.7	3.4	3.6	6.4	4.4
15							4.35	3.8	3.4	3.5	5.3	4.0
16							4.15	3.7	3.4	3.4	4.4	4.0
17							4.05	3.65	3.3	3.3	3.5	3.9
18							3.9	3.65	3.2	3.1	3.3	3.5
19							3.85	3.75	3.1	2.9	3.4	3.8
20							3.8	3.7	3.0	3.0	4.0	7.1
21							3.9	3.9	2.9	3.0	4.0	4.8
22						4.15	2.9	3.9	3.0	3.0	3.9	6.0
23						4.0	3.7	3.85	3.0	3.0	3.9	8.4
24						3.95	3.8	3.75	3.4	3.0	4.2	9.7
25						3.9	3.8	4.25	3.5	3.0	4.2	6.7
26						4.25	3.75	3.8	3.4	3.0	4.3	6.7
27						4.95	4.15	3.8	3.3	2.9	4.5	6.4
28						4.8	4.15	3.7	3.1	3.1	4.4	4.4
29						4.25	3.9	3.6	2.9	4.7	4.3	4.6
30						4.6	3.8	3.7	3.3	5.3	4.2	5.2
31							4.05	3.8		4.7		9.1
1908.[b]												
1	10.0				7.4	6.75	3.8	3.35	2.95	2.7	2.2	2.3
2	10.5				8.25	7.15	3.65	3.25	2.95	2.8	2.1	2.2
3	10.0				7.8	6.75	3.85	3.35	3.15	2.7	2.1	2.3
4	9.5		9.1		7.05	6.2	3.65	3.35	3.05	2.6	2.1	2.3
5		10.3			7.5	5.3	3.55	3.4	2.95	2.5	2.1	2.3
6					7.65	5.7	3.6	3.55	2.95	2.5	2.1	2.8
7					7.45	5.2	3.65	3.95	2.95	2.4	2.1	2.9
8	9.7			5.7	7.8	5.0	3.7	3.6	2.95	2.4	2.1	2.9
9					7.9	4.9	3.6	3.15	2.95	2.3	2.1	
10					7.85	4.85	3.6	3.1	2.85	2.3	2.1	
11			8.8		7.85	5.2	3.6	3.0	2.95	2.4	2.1	
12					7.25	4.75	3.55	2.95	2.95	2.4	2.1	
13		10.1			6.0	4.5	3.5	2.95	2.85	2.4	2.0	3.0
14					4.95	5.0	3.5	3.25	2.85	2.4	2.1	
15	7.5			4.2	6.2	4.55	3.7	3.35	2.85	2.4	2.1	
16					5.85	4.6	3.75	3.25	2.85	2.4	2.2	
17			9.3		6.1	5.1	3.45	3.15	2.75	2.4	2.2	
18					6.55	4.9	3.5	3.45	2.75	2.3	2.3	2.9
19		9.0			6.1	4.45	3.45	3.35	2.75	2.2	2.7	
20					6.55	4.3	3.55	3.35	2.75	2.2	2.5	
21					6.3	4.25	3.7	3.25	2.75	2.2	2.3	
22	8.7			3.1	5.65	4.05	3.2	3.15	2.65	2.2	2.4	2.9
23					5.2	4.05	3.1	3.15	2.7	2.2	2.5	
24					5.75	4.15	3.5	3.15	2.6	2.1	2.9	
25					4.75	4.05	3.55	3.15	2.6	2.1	2.8	3.0
26		8.7	9.6		4.7	3.9	3.3	3.05	2.5	2.1	2.7	
27				7.0	4.9	3.5	3.4	2.95	2.5	2.3	2.3	
28		9.0		8.6	4.8	4.75	3.4	2.95	2.5	2.3	2.4	
29	9.0			8.2	5.75	4.35	3.35	2.95	2.8	2.2	2.4	3.0
30				7.4	5.55	4.0	3.35	2.95	2.8	2.2	2.3	
31					6.4		3.35	2.95		2.2		

[a] Fourteen gates opened at Moosehead Lake November 7, and closed November 14, 1907. Anchor ice during the first half of December. Discharge affected by ice conditions about December 19 to 31, 1907.

[b] Discharge affected by ice conditions from January 1 to about April 26, about November 16 to 26, and December 1 to 31, 1908. Gage heights during the frozen periods are to water surface in a hole in the ice.

Rating table for Kennebec River at Bingham, Me., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.00	620	3.30	2,960	4.50	6,500	6.40	14,890
2.10	750	3.40	3,200	4.60	6,860	6.60	15,930
2.20	890	3.50	3,450	4.70	7,230	6.80	17,000
2.30	1,040	3.60	3,710	4.80	7,610	7.00	18,100
2.40	1,190	3.70	3,980	4.90	7,990	7.20	19,230
2.50	1,350	3.80	4,260	5.00	8,380	7.40	20,380
2.60	1,520	3.90	4,550	5.20	9,210	7.60	21,560
2.70	1,700	4.00	4,850	5.40	10,080	7.80	22,760
2.80	1,890	4.10	5,160	5.60	10,990	8.00	23,980
2.90	2,090	4.20	5,480	5.80	11,920	8.20	25,220
3.00	2,300	4.30	5,810	6.00	12,880	8.40	26,490
3.10	2,510	4.40	6,150	6.20	13,870	8.60	27,780
3.20	2,730						

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 7 discharge measurements made during 1906–1909 and is well defined.

Monthly discharge of Kennebec River at Bingham, Me., for 1907–8.

[Drainage area, 2,660 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
June 22 to 30	8,180	4,550	5,930	2.23	0.75	C.
July	12,600	2,090	5,950	2.24	2.58	C.
August	5,810	3,710	4,540	1.71	1.97	A.
September	4,400	2,090	3,150	1.18	1.32	A.
October	9,640	2,090	3,680	1.38	1.59	A.
November	25,200	2,960	9,740	3.66	4.08	A.
December	10,100	.....	5,660	2.13	2.46	B.
1908.						
January	.....	.....	3,200	1.20	1.38	C.
February	.....	.....	2,600	.977	1.06	C.
March	.....	.....	3,800	1.43	1.65	C.
April	27,800	.....	6,520	2.45	2.73	C.
May	25,500	7,230	15,600	5.86	6.76	C.
June	18,900	3,450	8,230	3.09	3.45	C.
July	4,400	2,510	3,540	1.33	1.53	C.
August	4,700	2,200	2,800	1.05	1.21	A.
September	2,620	1,350	1,930	.726	.81	A.
October	1,890	750	1,120	.421	.49	B.
November	1,190	.....	744	.280	.31	B.
December	.....	.....	749	.282	.33	C.
The year	27,800	.....	4,240	1.59	21.71	

NOTE.—Discharge December 19 to 31, 1907, determined from the discharge at The Forks and at Waterville. Discharge during the frozen periods in 1908 determined from a study of the discharge at The Forks and the conditions of storage at Moosehead Lake, climatological reports, and two measurements made under ice conditions.

	Second-feet.
Discharge December 19 to 31, 1907	6,000
April 1 to 26, 1908	4,000
November 16 to 26, 1908	600

KENNEBEC RIVER NEAR NORTH ANSON, ME.

This station is located 1½ miles east of North Anson and about 1 mile above the mouth of Carrabassett River, at a wooden highway bridge across the Kennebec, known locally as Patterson Bridge. It was established October 18, 1901, to obtain general statistical and comparative data regarding the flow of the Kennebec and was dis-

continued August 16, 1907, being superseded by the station at Bingham.

Dams are located at Solon, about 8 miles above the station, and at Madison, some 6 miles below. The discharge at North Anson is probably not affected by the dam at Madison. Considerable daily fluctuations in the gage heights at this station occur from about May 1 to July 31, owing to the regulation of the flow at Indian Pond dam for log driving. These fluctuations are, however, less marked than those at The Forks. The gage datum has remained the same during the maintainance of the station and is 243.83 feet above mean sea level, as determined by the Kennebec River survey of 1904, and readjusted in 1906. During the winter months the discharge is affected by ice.

The two rating curves developed for this station are fairly good at medium and low stages, but are somewhat uncertain at high stages. Frequent measurements have been made during frozen periods and fair estimates of discharge determined during ice conditions from the ratings developed. Further details of ice measurements at this point are given in Water-Supply Paper 187.

Data prior to 1907 have been revised and compiled in Water-Supply Paper No. 198.

Daily gage height, in feet, of Kennebec River near North Anson, Me., for 1907.

[H. C. Stetson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.4	4.35	.....	.....	12.95	6.75	6.6	5.2	.....	.....	.....	.....
2	4.55	4.4	.....	.....	12.95	6.6	7.7	4.7	.....	.....	.....	.....
3	4.55	4.5	5.9	.....	11.85	6.05	6.75	4.65	.....	.....	.....	.....
4	4.55	4.55	.....	.....	10.4	5.6	6.6	4.45	.....	.....	.....	.....
5	4.45	4.55	.....	.....	9.2	5.4	6.25	4.3	.....	.....	.....	.....
6	4.45	4.55	.....	.....	7.95	5.5	5.5	4.2	.....	.....	.....	.....
7	4.35	4.65	.....	5.8	6.6	5.7	5.0	4.3	.....	.....	.....	.....
8	4.35	4.65	.....	.....	6.55	5.45	5.0	4.25	.....	.....	.....	.....
9	4.35	4.65	.....	.....	7.35	5.65	5.2	4.15	.....	.....	.....	.....
10	4.35	4.7	5.6	.....	8.1	5.75	5.1	4.15	.....	.....	.....	.....
11	4.25	4.75	.....	.....	7.95	5.3	4.9_5	4.05	.....	.....	.....	.....
12	4.25	4.85	.....	.....	7.95	5.45	4.9	3.95	.....	.....	.....	.....
13	4.15	4.95	.....	.....	8.35	5.75	5.0_5	4.1	.....	.....	.....	.....
14	4.15	5.15	.....	5.2	8.2	5.85	4.8_5	3.8	.....	.....	.....	.....
15	4.15	5.35	.....	.....	9.1	5.7	4.9	4.3	.....	.....	.....	.....
16	4.15	5.55	.....	.....	8.75	4.5	4.3_5	4.1	.....	.....	.....	.....
17	4.15	5.55	5.8	.....	7.95	4.5	4.7	.....	.....	.....	.....	.....
18	4.15	5.65	.....	4.7	9.5	4.8	4.3	.....	.....	.....	.....	.....
19	4.15	5.85	.....	4.35	8.95	4.75	4.3	.....	.....	.....	.....	.....
20	4.25	6.05	.....	4.05	9.65	4.6	4.1_5	.....	.....	.....	.....	.....
21	4.25	6.10	.....	3.9	8.50	4.7	5.0	.....	.....	.....	.....	.....
22	4.25	.....	.....	3.85	7.75	4.6	3.9	.....	.....	.....	.....	.....
23	4.25	.....	.....	4.0	6.9	4.65	4.2	.....	.....	.....	.....	.....
24	4.25	.....	5.3	6.55	6.25	4.5	4.4	.....	.....	.....	.....	.....
25	4.25	.....	.....	8.1	6.0	4.5	4.2_5	.....	.....	.....	.....	.....
26	4.25	.....	.....	7.35	5.2	4.8	4.9	.....	.....	.....	.....	.....
27	4.25	.....	.....	8.25	5.2	5.7	5.2	.....	.....	.....	.....	.....
28	4.35	.....	.....	8.0	5.9	5.85	5.1	.....	.....	.....	.....	.....
29	4.35	.....	.....	8.4	7.2	5.05	5.1	.....	.....	.....	.....	.....
30	4.35	.....	.....	9.8	7.6	5.95	5.35	.....	.....	.....	.....	.....
31	4.35	.....	6.2	.....	7.4	.....	4.9	.....	.....	.....	.....	.....

NOTE.—Ice conditions prevailed from January 1 to April 17. Gage heights are to the top of the ice for January and February and to water surface in a hole cut in the ice March and April.

Rating tables for Kennebec River near North Anson, Me., for 1904–1907.

UNDER OPEN-CHANNEL CONDITIONS.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.90	990	3.20	2,797	4.50	5,536	6.60	11,310
2.00	1,080	3.30	2,978	4.60	5,779	6.80	11,920
2.10	1,182	3.40	3,164	4.70	6,026	7.00	12,550
2.20	1,294	3.50	3,355	4.80	6,277	7.20	13,200
2.30	1,415	3.60	3,551	4.90	6,532	7.40	13,880
2.40	1,544	3.70	3,752	5.00	6,790	7.60	14,580
2.50	1,680	3.80	3,958	5.20	7,316	7.80	15,300
2.60	1,822	3.90	4,169	5.40	7,858	8.00	16,030
2.70	1,970	4.00	4,385	5.60	8,415	9.00	19,930
2.80	2,124	4.10	4,606	5.80	8,984	10.00	24,030
2.90	2,284	4.20	4,832	6.00	9,565	11.00	28,530
3.00	2,450	4.30	5,062	6.20	10,130	12.00	33,130
3.10	2,621	4.40	5,297	6.40	10,710	13.00	37,930

NOTE.—The first table is not applicable for ice or obstructed-channel conditions. It is based on 7 discharge measurements made during 1904–1906 and the form of the 1903 curve. It is well defined below gage height 5 feet.

UNDER ICE COVER.

2.00	1,000	2.60	1,520	3.20	2,075	3.80	2,660
2.10	1,085	2.70	1,610	3.30	2,170	3.90	2,760
2.20	1,170	2.80	1,700	3.40	2,265	4.00	2,860
2.30	1,255	2.90	1,790	3.50	2,360	4.10	2,970
2.40	1,340	3.00	1,885	3.60	2,460	4.20	3,080
2.50	1,430	3.10	1,980	3.70	2,560	4.30	3,190

NOTE.—The second table is applicable only for ice-cover conditions. It is based on 13 discharge measurements made during 1904–1906, and is well defined between gage heights 2.5 feet and 3.4 feet. Gage heights refer to bottom of ice.

Monthly discharge of Kennebec River near North Anson, Me., for 1907.

[Drainage area, 2,790 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,920	1,040	1,440	0.516	0.59	C.
February	2,860	1,040	1,540	.552	.57	C.
March	.....	.....	2,450	.878	1.01	C.
April	23,200	.....	6,450	2.31	2.58	B.
May	37,700	7,320	17,400	6.24	7.19	B.
June	11,800	5,540	7,740	2.77	3.09	B.
July	14,900	4,170	7,190	2.58	2.97	B.
August 1–16	7,320	3,960	5,060	1.81	1.08	B.

KENNEBEC RIVER AT MADISON, ME.

The following measurements of the low-water discharge of Kennebec River at the new concrete dam of the Hollingsworth & Whitney Company were made and furnished for publication by C. S. Humphreys, engineer, Madison, Me.:

Discharge of Kennebec River at Madison, Me.

[Drainage area, 3,220 square miles.]

December 28, 1908 (Monday)	992
December 29, 1908	853
December 30, 1908	758
December 31, 1908	847

January 1, 1909	967
January 2, 1909	584
Mean for six days	834
Mean per square mile for six days	0.26

It is stated that no detailed gage readings were taken on Sunday, December 27, but from available information the discharge that day was at least 800 second-feet. Probably the mean flow for six days as given is substantially the mean for the week. It is stated that the above results are probably correct within 5 per cent.

KENNEBEC RIVER AT WATERVILLE, ME.

Observations of the flow of Kennebec River at Waterville have been made by the Hollingsworth & Whitney Company since November, 1891, and have been continuous since January 12, 1893. This company manufactures manila paper and ground-wood and sulphite pulp. The records for 1907 and 1908 have been furnished for computation by George H. Marr, engineer for the company.

The station is located about 2 miles above the mouth of Sebasticook River. Messalonskee Stream also enters about 3½ miles below the station.

The dam is of timber cribwork, the main portion having a vertical downstream face with a horizontal crest about 5.75 feet wide and an upstream slope of about 40° from the horizontal. The average elevation of the crest of the dam, as determined by levels during July, 1906, was 119.37 feet above the Hollingsworth & Whitney datum, or 71.53 feet above mean sea level, according to the Kennebec datum as corrected by levels of 1906. The total length of the dam is 800 feet, which includes a width of logway of 34 feet. Flashboards are kept on the dam a greater part of the time, their average elevation in July, 1906, being 123.73 feet above the Hollingsworth & Whitney datum, or 75.89 feet above mean sea level. The crest of the dam is in fairly good condition. The leakage has never been measured, but is assumed arbitrarily as 100 second-feet. The water which flows in the canals is used through 46 wheels, most of which have been rated at Holyoke under practically the same head, the average head at Waterville being about 23 feet. Some water is lost from the canal through small waste gates and over wasteweirs. A small amount, estimated at 100 second-feet, is used for washing and mill purposes.

Methods and diagrams for estimating the flow through the wheels and over the dam were developed by the late Sumner Hollingsworth, engineer for the company. Observations were made at 12 o'clock noon of each day, that hour having been chosen after investigation as a time when the flow is least affected by storage of dams upstream and as giving most nearly the average for the day. When the flow

of the river is less than about 3,500 second-feet, all of the water is used through the wheels.

Prior to 1906 some errors have occurred in computing discharge data at this point, owing to the use of inaccurate information regarding flashboards, and the records are considered as only fair. Since 1906 more care has been taken and the present results are fairly good.

The maximum crest discharge since records have been kept occurred from 7 until 9 a. m. December 16, 1901, and was 156,800 second-feet. The average discharge during the twenty-four hours of December 16, 1901, was 127,000 second-feet. This was probably the greatest flood occurring in the last century on the Kennebec, and even with this great discharge much of the flood flow above Moosehead Lake (some 1,240 square miles of drainage area) was being held in the lake. (See Water-Supply Paper 198 for discussion of this flood.)

The discharge for the minimum week occurred December 14 to 20, 1903, and averaged 638 second-feet.

Data prior to 1907 have been compiled in Water-Supply Paper 198.

Daily discharge, in second-feet, of Kennebec River at Waterville, Me., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3,290	2,410	3,200	16,900	43,500	45,400	12,000	7,670	[a] 3,740	9,040	8,600	[a] 5,610
2	4,260	2,670	3,400	16,500	44,000	[a] 47,300	18,800	6,930	4,700	6,980	6,260	6,010
3	4,420	[a] 2,110	[a] 2,660	13,500	35,300	37,000	15,300	7,200	4,670	6,740	[a] 5,740	5,600
4	4,280	2,690	3,530	10,800	29,400	28,600	8,530	[a] 5,660	8,170	5,480	27,900	4,790
5	4,160	2,640	3,340	12,600	[a] 27,900	27,500	9,990	6,510	6,040	7,460	16,700	4,740
6	[a] 2,980	2,380	3,330	15,800	21,100	18,400	8,690	6,480	7,530	[a] 7,410	10,300	4,740
7	4,010	2,380	3,070	[a] 13,000	17,300	14,800	[a] 8,690	6,330	7,140	6,360	70,300	5,170
8	3,570	2,560	3,030	13,400	14,400	12,700	8,180	6,820	[a] 5,700	6,080	71,200	[a] 6,240
9	3,300	2,680	3,040	11,000	18,000	[a] 15,400	8,190	6,520	4,530	13,800	47,900	5,020
10	3,970	[a] 2,120	[a] 2,080	9,030	17,900	15,900	9,270	5,330	4,340	11,800	[a] 44,500	5,180
11	2,760	2,970	3,380	7,870	18,300	16,000	8,210	[a] 5,260	4,030	13,000	38,700	25,200
12	2,760	2,720	3,110	8,450	[a] 18,400	16,200	8,190	5,090	3,670	7,230	31,700	41,200
13	[a] 1,840	2,380	3,060	8,640	16,600	14,700	8,630	5,280	6,800	[a] 6,760	28,300	30,800
14	2,730	2,710	3,070	[a] 15,700	18,800	16,800	[a] 8,630	4,970	5,900	7,040	26,200	23,700
15	2,620	2,680	2,800	22,900	17,900	14,000	8,230	4,500	[a] 4,030	5,980	24,300	[a] 14,000
16	2,680	3,280	2,770	19,000	19,300	[a] 13,000	7,560	4,970	4,350	5,380	17,700	14,100
17	2,410	[a] 2,410	[a] 2,210	13,900	20,000	13,500	7,070	5,180	4,210	4,840	[a] 6,520	14,400
18	2,400	3,540	3,900	13,500	21,400	16,200	3,990	[a] 4,090	4,230	4,050	5,560	13,800
19	2,100	2,940	3,340	12,900	[a] 20,800	15,400	6,170	4,670	4,040	4,130	4,180	12,200
20	[a] 1,120	3,230	3,880	12,900	22,000	12,500	5,170	4,180	3,740	[a] 3,100	6,380	13,400
21	2,420	3,280	3,950	[a] 12,100	20,600	11,500	[a] 18,400	3,700	3,200	4,090	6,460	15,100
22	2,700	3,820	3,980	6,400	18,000	9,500	9,490	5,000	[a] 2,160	3,990	6,410	[a] 12,600
23	2,720	3,790	4,400	9,700	14,500	[a] 9,910	5,780	5,040	3,190	3,720	6,380	15,400
24	3,010	[a] 2,650	[a] 3,740	29,700	12,200	5,400	7,640	4,850	3,370	3,960	[a] 6,210	15,400
25	2,750	3,790	4,990	41,400	10,600	5,160	8,030	[a] 4,910	4,850	3,420	7,300	17,600
26	2,540	3,780	4,270	24,500	[a] 12,000	4,440	7,420	5,490	5,640	3,950	8,860	21,700
27	[a] 2,120	3,760	4,300	29,600	9,660	5,270	9,960	5,070	4,920	[a] 2,990	9,330	19,700
28	2,730	3,240	4,150	[a] 25,700	10,300	6,300	[a] 9,090	4,800	4,220	3,470	8,060	16,800
29	2,590	.....	4,040	26,500	14,400	8,630	7,620	4,840	[a] 3,050	24,500	7,840	[a] 14,900
30	2,640	.....	10,400	29,200	13,600	[a] 7,800	7,270	4,570	4,810	26,900	7,340	13,700
31	2,430	.....	[a] 16,200	.....	13,500	.....	6,120	4,040	.....	15,500	.....	13,400
1908.												
1	4,210	3,920	[a] 2,720	8,110	16,700	27,900	4,920	3,490	2,960	2,490	[a] 100	2,150
2	4,070	[a] 2,720	3,900	8,510	26,700	20,000	4,990	[a] 3,200	2,820	2,260	2,350	2,460
3	4,020	3,690	3,660	8,930	[a] 18,300	16,800	4,260	3,350	2,960	2,540	1,950	1,500
4	4,000	3,950	3,920	9,890	12,200	13,100	2,460	2,960	3,030	[a] 940	1,670	1,890
5	[a] 2,680	3,930	3,910	[a] 7,090	9,940	10,900	[a] 4,060	3,050	2,820	2,450	1,800	1,430

[a] Sundays.

Daily discharge, in second-feet, of Kennebec River at Waterville, Me., for 1907–8—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
6	3,990	3,710	3,890	4,540	10,700	5,900	4,180	4,660	[a] 1,530	2,480	1,680	[a] 100
7	3,920	3,940	3,970	7,080	10,700	[a] 4,940	4,010	7,610	2,410	2,120	1,050	1,150
8	4,160	3,950	[a] 2,670	9,930	9,180	5,330	4,260	5,620	2,380	1,400	[a] 100	1,170
9	4,450	[a] 2,770	3,970	5,650	12,100	5,240	4,020	[a] 4,240	680	1,230	1,000	1,500
10	4,390	3,920	3,900	7,060	[a] 12,100	5,090	4,240	4,150	2,430	1,150	1,220	1,190
11	4,040	3,940	3,880	5,240	14,600	5,150	4,060	3,460	2,460	[a] 1,240	1,430	1,220
12	[a] 2,570	3,980	3,890	[a] 6,520	11,600	5,190	[a] 3,960	4,220	2,220	1,640	1,400	1,510
13	4,030	3,960	3,940	7,790	8,770	5,110	4,870	4,480	[a] 1,290	2,020	1,420	[a] 250
14	4,020	3,680	3,960	5,630	5,360	[a] 5,000	4,740	5,160	2,440	2,230	1,450	930
15	4,050	3,930	[a] 2,940	6,000	5,300	6,960	4,740	5,080	2,230	2,080	[a] 100	1,530
16	3,950	[a] 5,380	4,380	6,570	5,610	5,570	4,650	[a] 3,670	2,210	1,850	1,480	1,460
17	3,920	4,950	5,040	6,000	[a] 3,870	6,670	4,640	3,840	2,540	1,630	1,500	1,080
18	3,980	4,480	4,830	5,700	5,150	7,520	4,530	4,520	2,410	[a] 300	1,510	1,470
19	[a] 2,820	4,070	4,520	[a] 5,350	6,240	8,160	[a] 3,390	4,790	2,270	1,260	1,590	1,450
20	4,050	4,000	4,250	5,510	4,950	6,090	4,530	4,820	[a] 900	1,800	1,590	[a] 290
21	4,000	4,010	4,070	5,440	5,510	[a] 4,850	4,690	4,440	1,260	2,260	1,120	1,050
22	4,020	4,000	[a] 2,880	5,080	4,990	5,250	4,120	4,350	2,520	2,020	[a] 100	1,440
23	4,030	[a] 2,720	4,430	5,120	4,830	5,240	4,170	[a] 3,310	2,190	100	1,030	1,160
24	3,960	3,870	7,620	7,280	[a] 3,860	5,070	4,460	3,430	2,170	1,690	1,010	190
25	4,020	3,860	10,700	8,480	5,330	5,200	3,600	3,440	2,170	[a] 640	1,000	1,800
26	[a] 2,730	3,850	7,890	[a] 10,900	4,620	5,160	[a] 3,440	3,370	2,200	1,710	280	750
27	4,030	3,900	7,940	17,900	4,940	5,150	4,480	2,860	[a] 690	1,680	1,430	[a] 860
28	4,760	3,840	9,690	24,200	6,280	[a] 4,070	3,840	2,900	2,050	1,300	2,040	1,040
29	4,090	3,890	[a] 8,940	29,200	5,210	5,240	2,780	2,840	1,940	1,740	[a] 1,760	1,730
30	3,990	.....	8,010	17,600	4,800	5,110	2,930	[a] 2,290	2,270	2,400	2,610	1,390
31	3,980	.....	8,140	.....	[a] 13,900	.....	3,480	3,190	.....	1,970	.....	990

[a] Sundays.

Monthly discharge of Kennebec River at Waterville, Me., for 1907–8.

[Drainage area, 4270 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	4,420	1,120	2,910	0.681	0.79
February	3,820	2,110	2,910	.681	.71
March	16,200	2,080	4,080	.956	1.10
April	41,400	6,400	16,800	3.93	4.38
May	44,000	9,660	19,700	4.61	5.32
June	47,300	4,440	16,200	3.79	4.23
July	18,800	3,990	8.910	2.09	2.41
August	7,670	3,700	5,350	1.25	1.44
September	8,170	2,160	4,700	1.10	1.23
October	26,900	2,990	7,710	1.81	2.09
November	71,200	4,180	19,100	4.47	4.99
December	41,200	4,740	13,900	3.26	3.76
The year	71,200	1,120	10,200	2.39	32.45
1908.					
January	4,760	2,570	3,900	0.913	1.05
February	5,380	2,720	3,890	.911	.98
March	10,700	2,670	5,110	1.20	1.38
April	29,200	4,540	8,940	2.09	2.33
May	26,700	3,860	8,850	2.07	2.39
June	27,900	4,070	7,570	1.77	1.98
July	4,990	2,460	4,110	.963	1.11
August	7,610	2,290	3,960	.927	1.07
September	3,030	680	2,150	.504	.56
October	2,540	100	1,700	.398	.46
November	2,610	100	1,290	.302	.34
December	2,460	100	1,230	.288	.33
The year	29,200	100	4,390	1.03	13.98

ROACH RIVER AT ROACH RIVER, ME.

Roach River receives drainage from the slopes of Boardman and White Cap mountains in west-central Piscataquis County, flows northwestward through a series of three ponds, and empties into Spencer Bay on the east side of Moosehead Lake. It is about 20 miles long, drains an area of 120 square miles, and its basin is completely forested. Dams at the outlets of several ponds control the flow of the river for log driving.

The gaging station is located at the outlet of Lower Roach Pond, near the village of Roach River, and is reached from Greenville Junction by stage or steamer or from Kineo by steamer. It was established November 10, 1901, to obtain general statistical and comparative data regarding the flow of the river, and was discontinued June 30, 1908. The gage is located about 100 feet downstream from the lowest of the dams, at which point the river is so completely under control that the stage varies but little for weeks at a time.

The gage datum has remained the same during the maintenance of the station. The discharge is affected by ice in the winter months. Conditions for obtaining accurate discharge data are good, and a good rating curve has been developed except for discharges below 2 second-feet.

Data prior to 1907 have been revised and compiled in Water-Supply Paper 198.

Daily gage height, in feet, of Roach River at Roach River, Me., for 1907–8.

[C. J. Sawyer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	2.3	.....	.....	2.3	2.6	3.3	2.2	2.5	2.9	2.8	2.9	2.6
2	2.3	.....	.....	2.3	4.6	3.3	2.3	2.5	2.9	2.8	2.9	2.6
3	2.3	.....	.....	2.3	3.8	3.3	2.2	2.5	2.9	2.8	2.9	2.6
4	2.3	.....	.....	2.3	4.6	5.6	2.2	2.5	2.9	2.8	2.9	2.6
5	2.3	.....	.....	2.3	4.6	5.8	2.2	3.0	2.9	2.8	2.9	2.6
6	2.3	.....	.....	2.3	4.3	6.0	2.2	3.0	2.9	2.8	2.9	2.6
7	2.3	.....	.....	2.3	4.3	2.8	2.2	3.0	2.9	2.8	2.9	2.6
8	2.3	.....	.....	2.3	2.3	2.8	2.2	3.0	2.9	2.8	2.9	2.6
9	2.3	.....	.....	2.3	4.3	2.8	2.2	3.0	2.9	2.8	2.9	2.6
10	2.3	.....	.....	2.3	4.3	2.8	2.2	3.0	2.9	2.8	3.2	2.6
11	2.3	.....	.....	2.3	4.3	2.8	2.2	2.9	2.9	2.8	3.2	2.6
12	2.3	.....	.....	2.3	4.2	2.8	2.2	2.9	2.9	2.8	3.7	2.6
13	.....	.....	.....	2.3	3.7	2.8	2.3	2.9	2.9	2.8	4.2	2.6
14	.....	.....	.....	2.3	3.2	2.8	2.4	2.9	2.9	2.8	4.2	2.6
15	.....	.....	.....	2.3	3.2	2.8	2.4	2.9	2.9	2.8	4.2	2.6
16	.....	.....	.....	2.3	5.6	2.8	2.4	2.9	2.9	2.8	4.2	2.6
17	.....	2.1	.....	2.3	5.6	2.8	2.4	2.9	2.8	2.8	4.2	2.6
18	.....	.....	.....	2.3	5.6	2.8	2.4	2.9	2.8	2.8	4.2	2.6
19	.....	.....	.....	2.4	5.6	2.8	2.4	2.9	2.8	2.8	3.4	2.6
20	.....	.....	.....	2.4	4.45	2.8	3.4	2.9	2.8	2.9	2.6	2.6
21	.....	.....	.....	2.4	3.3	5.0	3.4	2.9	2.8	2.9	2.6	2.6
22	2.1	.....	2.1	2.4	5.6	5.0	3.4	2.9	2.8	2.9	2.6	2.6
23	.....	.....	.....	2.5	5.6	2.7	3.4	2.9	2.8	2.9	2.6	2.5
24	.....	.....	.....	2.6	3.3	2.7	3.4	2.9	2.8	2.9	2.6	2.5
25	.....	.....	.....	2.6	5.6	4.7	2.4	2.9	2.8	2.9	2.6	2.5

[a] See note at end of table next page.

Daily gage height, in feet, of Roach River at Roach River, Me., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
26	.....	.....	.....	2.6	3.3	4.5	2.4	2.9	2.8	2.9	2.6	2.5
27	.....	.....	.....	2.6	3.3	2.3	2.4	2.9	2.8	2.9	2.6	2.5
28	2.1	.....	.....	2.6	5.6	4.7	2.4	2.9	2.8	2.9	2.6	2.5
29	.....	.....	.....	2.6	5.6	4.7	2.4	2.9	2.8	2.9	2.6	2.5
30	.....	.....	.....	2.6	5.6	4.7	2.5	2.9	2.8	2.9	2.6	2.4
31	.....	.....	.....	.....	5.6	.....	2.5	2.9	.....	2.9	.....	2.4

NOTE.—Ice conditions prevailed from about January 1 to March 31, 1907. Gage heights are to water surface in a hole in the ice. Ice in sluice from December 23 to 31, 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	2.4	2.4	2.5	2.5	5.0	5.5	16	2.4	2.5	2.5	2.55	3.9	2.5
2	2.4	2.4	2.5	2.5	5.6	5.5	17	2.3	2.5	2.5	2.6	5.2	2.5
3	2.4	2.4	2.5	2.5	5.2	5.5	18	2.3	2.5	2.5	2.6	5.2	2.5
4	2.4	2.4	2.5	2.5	3.65	2.5	19	2.3	2.5	2.5	2.6	5.2	2.5
5	2.4	2.4	2.5	2.55	3.1	2.5	20	2.3	2.5	2.5	2.6	5.2	2.5
6	2.4	2.4	2.5	2.55	5.3	2.5	21	2.3	2.5	2.5	2.6	2.3	2.5
7	2.5	2.4	2.5	2.55	5.4	2.5	22	2.4	2.5	2.5	2.6	5.4	2.5
8	2.5	2.4	2.5	2.55	3.85	2.5	23	2.4	2.5	2.5	2.6	2.3	2.5
9	2.5	2.4	2.5	2.55	2.3	2.5	24	2.4	2.5	2.5	2.6	3.85	2.5
10	2.5	2.4	2.5	2.55	2.3	2.5	25	2.4	2.5	2.5	2.6	2.3	2.5
11	2.5	2.4	2.5	2.55	2.3	2.5	26	2.4	2.5	2.5	2.6	2.3	2.5
12	2.4	2.4	2.5	2.55	2.3	2.5	27	2.4	2.5	2.5	2.55	2.3	2.5
13	2.4	2.4	2.5	2.55	2.3	2.5	28	2.4	2.5	2.5	2.5	2.3	2.5
14	2.4	2.4	2.5	2.55	5.4	2.5	29	2.4	2.5	2.5	2.5	2.3	2.7
15	2.4	2.5	2.5	2.55	5.4	2.5	30	2.4	.....	2.5	3.5	3.85	2.7
							31	2.4	.....	2.5	.....	5.4	.....

NOTE.—No information is available regarding ice conditions during 1908. It is probable that February and March were more or less affected.

Rating table for Roach River at Roach River, Me., for 1901–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.20	46	3.20	379	4.20	820	5.20	1,335
2.30	68	3.30	421	4.30	865	5.30	1,390
2.40	94	3.40	463	4.40	915	5.40	1,445
2.50	122	3.50	506	4.50	965	5.50	1,500
2.60	153	3.60	550	4.60	1,015	5.60	1,555
2.70	186	3.70	595	4.70	1,065	5.70	1,610
2.80	221	3.80	640	4.80	1,115	5.80	1,670
2.90	258	3.90	685	4.90	1,170	5.90	1,730
3.00	298	4.00	730	5.00	1,225	6.00	1,790
3.10	338	4.10	775	5.10	1,280		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 10 discharge measurements made during 1902–1905 and is fairly well defined.

Monthly discharge of Roach River at Roach River, Me., for 1907–8.

[Drainage area, 85 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January			50	0.588	0.68	D.
February			30	.353	.37	D.
March			50	.588	.68	D.
April	153	68	93.1	1.10	1.23	C.
May	1,560	68	974	11.5	13.26	B.
June	1,790	68	582	6.85	7.64	B.
July	463	46	137	1.61	1.86	C.
August	298	122	248	2.92	3.37	B.
September	258	221	241	2.84	3.17	B.
October	258	221	235	2.76	3.18	B.
November	820	153	358	4.21	4.70	B.
December	153	94	142	1.67	1.92	C.
The year	1,790		262	3.08	42.06	
1908.						
January	122	68	94	1.11	1.28	C.
February	122	94	108	1.27	1.37	D.
March	122	122	122	1.44	1.66	D.
April	506	122	152	1.79	2.00	B.
May	1,560	68	725	8.53	9.83	B.
June	1,500	122	264	3.11	3.47	B.

NOTE.—Discharge January to March, 1907, based on a study of discharge at all stations in the Kennebec River basin, and the effect of storage at Moosehead Lake. Discharge during the winter period, 1908, applied from the open-channel rating table without reduction; results may be somewhat too high.

DEAD RIVER NEAR THE FORKS, ME.

Dead River is formed by the junction of its North and South branches. The North Branch rises in the northern part of Franklin County and flows in a general southeasterly direction about 25 miles to Eustis, where it is joined by the South Branch. The South Branch rises in the mountains east of Rangeley Lakes and flows in a general northeasterly direction about 16 miles. From the junction of the two branches the main stream flows eastward, northward, and then eastward to its junction with Kennebec River at The Forks, 24 miles below Moosehead Lake. The river has an extreme length of about 40 miles, drains an area of 870 square miles, and its basin is almost completely forested. The basin contains many lakes and ponds, the most important being Flagstaff and Spring lakes and Carry and Spencer ponds. Water is stored for log driving only. The dams are owned by the log-driving companies and the gates are kept open after the drives are out of the river. Opportunities for increased storage are numerous, and between Flagstaff and The Forks, about 36 miles, there is approximately 500 feet of fall which is entirely undeveloped. This river, with its steep slopes and little-utilized storage, contributes largely to floods on the Kennebec.

The gaging station is located 1½ miles west of The Forks. It was established September 29, 1901, to obtain general statistical data

regarding the total flow of Dead River, and was discontinued August 15, 1907.

The gage datum has remained unchanged since the establishment of the station. During the winter months the discharge is affected by ice. Conditions for obtaining accurate discharge data are good, and a good rating curve has been developed.

Discharge measurements of Dead River near The Forks, Me., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
1907.					
June 20	F. E. Pressey	238	567	1.60	1,320
1908.					
September 24	F. E. Pressey	190	244	.55	134
November 5 [a]	Wood and French	123	114	.50	134
December 17 [b]	F. E. Pressey	200	205	.80	116

[a] Wading measurement 800 feet above cable section.
[b] Measurement under ice cover. Gage height to top of ice, 0.7 feet. Average thickness of ice, 0.95 foot.

Daily gage height, in feet, of Dead River near The Forks, Me., for 1907.

[Jeremiah Durgin, jr., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.55			3.5	6.0	2.45	2.2	2.05				
2	1.5			2.9	6.9	2.05	2.5	2.05				
3	1.4			2.45	6.35	3.0	3.05	1.9				
4	1.4			2.0	6.45	2.3	2.9	1.8				
5	1.4			2.0	5.2	2.25	2.55	1.8				
6				1.9	4.7	2.3	2.0	1.7				
7				1.8	4.15	2.25	1.75	1.8				
8				1.7	4.35	2.95	1.7	1.7				
9				1.7	3.9	2.4	1.7	1.65				
10				1.6	4.05	1.95	1.7	1.55				
11				1.55	4.55	2.45	1.65	1.5				
12				1.55	4.45	2.55	1.6	1.5				
13				1.6	4.5	3.05	1.6	1.4				
14				1.6	3.2	2.6	1.7	1.25				
15				1.7	3.75	2.05	1.9	1.15				
16				1.7	4.05	2.0	1.7					
17			1.6	1.7	4.6	1.85	1.65					
18			1.7	1.7	4.15	1.6	1.6					
19			1.7	1.8	4.05	1.8	1.6					
20			1.95	1.7	4.15	1.7	1.6					
21			2.4	1.7	4.45	1.7	1.5					
22			2.6	1.7	4.45	1.7	1.4					
23			2.8	2.3	3.7	1.7	1.5					
24			2.9	3.15	2.45	1.8	1.55					
25			2.55	3.65	2.55	1.95	1.55					
26			2.4	3.75	2.45	2.15	1.5					
27			2.5	3.85	2.55	2.45	1.4					
28			2.6	3.75	4.0	2.55	1.5					
29			2.6	4.0	3.05	2.35	1.6					
30			2.7	5.05	2.5	2.1	1.85					
31			2.7		2.5		1.9					

NOTE.—Ice conditions prevailed from about January 1 to April 10.

Rating table for Dead River near The Forks, Me., for 1902–1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.40	45	1.70	1,505	3.00	3,790	4.60	8,420
.50	110	1.80	1,650	3.10	4,010	4.80	9,140
.60	185	1.90	1,795	3.20	4,240	5.00	9,890
.70	270	2.00	1,945	3.30	4,480	5.20	10,680
.80	365	2.10	2,100	3.40	4,730	5.40	11,500
.90	470	2.20	2,260	3.50	4,990	5.60	12,340
1.00	580	2.30	2,430	3.60	5,260	5.80	13,200
1.10	700	2.40	2,600	3.70	5,540	6.00	14,080
1.20	825	2.50	2,780	3.80	5,830	6.20	14,980
1.30	955	2.60	2,970	3.90	6,130	6.40	15,900
1.40	1,090	2.70	3,160	4.00	6,430	6.60	16,840
1.50	1,225	2.80	3,360	4.20	7,060	6.80	17,800
1.60	1,365	2.90	3,570	4.40	7,730	7.00	18,780

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903 to 1908 and is well defined.

Monthly discharge of Dead River near The Forks, Me., for 1907.

[Drainage area, 870 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	380	0.437	0.50	D.
February	.....	.....	200	.230	.24	D.
March	.....	.....	577	.663	.76	D.
April	10,100	.....	2,440	2.80	3.12	B.
May	18,300	2,690	7,380	8.48	9.78	A.
June	3,900	1,360	2,310	2.66	2.97	A.
July	3,900	1,090	1,690	1.94	2.24	A.
August 1 to 15	2,020	762	1,450	1.67	.93	A.

NOTE.—Discharge January to March based on a study of discharge at all stations in the Kennebec River basin and the effect of storage at Moosehead Lake.
Discharge April 1 to 10 estimated 1,000 second-feet.

CARRABASSETT RIVER NEAR NORTH ANSON, ME.

Carrabassett River rises in eastern Franklin County, flows northward, eastward, and then southeastward, and enters Kennebec River at North Anson. Its basin is characterized by steep slopes, rapid fall, no large tributaries, and few lakes and ponds, and the flow of the stream is variable. The river is used to some extent for power development at Kingfield, East New Portland, and North Anson. It shares with Sandy River a large part of the responsibility for floods on the main stream below Madison.

The gaging station was established October 19, 1901, to obtain general statistical data regarding the total flow of the river, and was discontinued April 30, 1907. It was located about 4 miles from North Anson, above Embden Brook and below Anson Brook.

The datum of the gage remained the same during the maintenance of the station. In the winter months the flow is affected by ice.

Conditions for obtaining accurate discharge data are good except at low stages, and a good rating curve has been developed for medium stages. At low stages the channel conditions are somewhat unstable. The rating curve has not been developed for high stages, and it is probable that the extension used gives results which are somewhat too small.

Daily gage height, in feet, of Carrabassett River near North Anson, Me., for 1907.

[Nahum Hilton, observer.]

Day.	Jan.	Apr.	May.	Day.	Jan.	Apr.	May.	Day.	Jan.	Apr.	May.
1	1.9	4.3	7.8	11	.....	2.0	.....	21	.....	2.0	.....
2	2.1	3.9	6.6	12	.....	1.7	.....	22	.....	1.8	.....
3	2.1	3.6	5.7	13	.....	2.0	.....	23	.....	2.5	.....
4	2.2	3.2	4.2	14	.....	1.8	.....	24	.....	5.1	.....
5	1.9	3.0	.....	15	.....	2.0	.....	25	.....	7.0	.....
6	.....	3.4	.....	16	.....	1.9	.....	26	.....	4.5	.....
7	.....	3.1	.....	17	.....	1.8	.....	27	.....	5.0	.....
8	.....	2.9	.....	18	.....	1.9	.....	28	.....	4.8	.....
9	.....	2.7	.....	19	.....	2.0	.....	29	.....	5.0	.....
10	.....	2.4	.....	20	.....	2.2	.....	30	.....	5.8	.....

NOTE.—River frozen January 5 to March 30.

Rating table for Carrabassett River near North Anson, Me., for 1906–7.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
−0.10	77	1.20	675	2.40	1,795	4.20	4,020
.00	92	1.30	755	2.50	1,900	4.40	4,290
.10	110	1.40	840	2.60	2,010	4.60	4,560
.20	133	1.50	925	2.70	2,120	4.80	4,830
.30	160	1.60	1,015	2.80	2,235	5.00	5,100
.40	193	1.70	1,105	2.90	2,350	5.20	5,370
.50	233	1.80	1,195	3.00	2,470	5.40	5,640
.60	280	1.90	1,290	3.20	2,710	5.60	5,910
.70	335	2.00	1,385	3.40	2,955	5.80	6,180
.80	395	2.10	1,485	3.60	3,210	6.00	6,450
.90	455	2.20	1,585	3.80	3,480	7.00	7,800
1.00	520	2.30	1,690	4.00	3,750	8.00	9,150
1.10	595						

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1902–1906 and is well defined.

Monthly discharge of Carrabassett River near North Anson, Me., for 1907.

[Drainage area, 340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	.....	.....	250	0.735	0.85	D.
February	.....	.....	150	.441	.46	D.
March	.....	.....	400	1.18	1.36	D.
April	7,800	1,100	2,330	6.85	7.64	B.
May 1–4	8,880	4,020	6,550	19.3	2.87	C.

NOTE.—Discharge during the frozen period very uncertain. It is based on open-channel intercomparisons with adjacent streams.

SANDY RIVER NEAR MADISON, ME.

Sandy River rises in the western part of Franklin County, in the hilly region east of Rangeley Lake, flows southeastward about 32 miles, then northeastward 17 miles, entering the Kennebec about 3 miles below Madison. Its drainage area measures 670 square miles. It has no large tributaries or ponds. It has a total fall of about 1,600 feet, mostly in the upper part of the basin, but its flow is variable and it is not very important for power, although small developments have been made at Madison, Farmington, Phillips, and a few other points. The upper areas of the basin are timbered, but in general it is made up of farm lands. This stream, with its quick-spilling proclivities, shares with Carrabassett River a large part of the responsibility for floods on the Kennebec below Madison.

The gaging station was established March 23, 1904, to obtain general statistical data regarding the total flow of the river, and was discontinued December 31, 1908. It was located about 2 miles from the mouth of the river, at the dam of the Madison electric works—a municipal light and power plant—just over the town line in Stark, but nearer the Madison post-office.

The dam rests on ledge rock and has a fairly level crest, 341.4 feet in length (except that a log way 15 feet long and 0.75 feet deep was cut near the left end of the dam during 1906) between vertical abutments. The crest is 1 foot wide on top, sloping from the upstream edge 4.75 horizontal to 1.25 vertical, while the downstream face of the dam is vertical. The level top is of dressed stone (6-cut); the remainder is quarry faced, but care has been taken to leave no considerable projection on the approach to the crest. Flashboards are used most of the time. The head developed is about 15 feet, which is used in a power development on the right bank, consisting of a head bay nearly 100 feet long, decreasing in width from 40 to 20 feet at the racks, and one pair of 38-inch McCormick turbines (rated at Holyoke), with complete arrangements for a second pair if found necessary. The pondage extends back about 2 miles, but there is no side flowage. When water is more than 3 feet deep on the dam, the crest is increased in length about 87.5 feet by flowing over the wall of the fore bay. Since 1906 the wheels and generators have, as a rule, been in operation day and night, and the discharge has been computed from wheel-gate openings and head-gage readings.

The datum of the gages has been the same since the establishment of the station. Records are obtained through the courtesy and assistance of C. S. Humphreys, of Madison, engineer in charge. During the winter months the discharge is affected by the presence of ice along the crest of the dam. Conditions for obtaining accurate discharge data are poor, owing to the uncertain conditions of flashboards and the length of crest which occasions very slight depths at

medium and low water stages and consequently much inaccuracy in estimating discharge.

Data prior to 1907 have been compiled in Water-Supply Paper 198.

The maximum daily discharge recorded since the establishment of the station occurred November 7, 1907, and was about 13,800 second-feet. Discharge for the minimum week occurred September 19 to 25, 1908, and averaged 30 second-feet.

Discharge measurements of Sandy River near Madison, Me., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907. September 19 [a].	F. E. Pressey	130	100	100.18	189
1908. September 22 [b].	F. E. Pressey	50	20	96.96	4.5

[a] Wading measurement one-fourth mile below the dam and 100 feet above a ford.
[b] Measurement made about 300 feet below dam. Power plant shut down. This measurement represents the leakage through the wheels and dam.

Daily discharge in second-feet of Sandy River near Madison, Me., for 1907–8.

[Samuel Brackett, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	334	178	100	4,640	9,620	1,910	1,700	263	[a] 66	1,620	2,070	[a] 333
2	549	187	100	3,100	7,500	[a] 1,230	1,340	320	60	970	1,640	345
3	510	[a] 206	[a] 100	2,370	4,710	1,140	676	451	68	626	[a] 6,380	362
4	457	182	89	2,370	3,760	1,180	380	[a] 366	176	731	6,320	392
5	381	170	88	3,330	[a] 3,420	1,010	302	539	514	1,720	3,060	336
6	[a] 303	181	91	3,710	2,800	2,240	220	474	1,080	[a] 1,110	2,790	334
7	298	165	92	[a] 3,230	2,550	2,600	[a] 220	451	579	685	13,800	402
8	281	173	92	2,980	2,630	2,050	212	366	[a] 322	1,040	8,040	[a] 482
9	308	174	90	2,320	3,370	[a] 1,620	712	309	195	3,260	4,300	460
10	248	[a] 171	[a] 95	1,430	3,520	1,370	625	204	156	1,520	[a] 3,380	989
11	248	176	89	2,080	3,090	1,240	543	[a] 196	157	1,000	2,500	5,990
12	255	145	87	1,800	[a] 2,610	997	300	147	462	988	1,930	2,580
13	[a] 285	157	89	2,030	1,980	857	453	139	1,050	[a] 1,260	1,540	1,180
14	285	165	91	[a] 2,250	2,510	688	[a] 424	112	475	841	1,200	874
15	293	169	91	2,650	2,030	589	304	112	[a] 310	656	974	[a] 694
16	347	132	133	3,060	2,000	[a] 558	209	112	197	549	860	630
17	390	[a] 132	[a] 143	3,220	2,950	412	185	168	166	495	[a] 747	489
18	439	121	161	3,370	2,710	388	172	[a] 160	144	447	703	835
19	448	108	197	3,660	[a] 2,120	313	133	112	[b] 145	403	672	768
20	[a] 414	120	217	3,630	2,190	263	546	95	106	[a] 361	603	414
21	369	130	182	[a] 2,970	1,810	465	[a] 2,660	86	107	282	539	921
22	415	119	300	3,000	1,330	372	1,910	67	[a] 123	282	563	[a] 876
23	384	112	352	4,090	1,080	[a] 313	837	62	100	282	630	917
24	490	[a] 116	[a] 553	11,600	697	114	90	66	164	282	[a] 636	2,390
25	523	108	640	8,460	971	122	382	[a] 75	667	249	627	2,620
26	472	93	661	6,420	[a] 646	153	562	64	504	248	1,090	1,980
27	[a] 415	96	620	7,460	866	80	1,470	65	326	[a] 238	1,020	1,510
28	320	100	912	[a] 7,180	2,650	120	[a] 788	63	236	941	795	1,460
29	320	.....	1,190	6,840	3,390	304	458	62	[a] 507	9,130	618	[a] 1,430
30	300	.....	2,440	7,150	2,130	[a] 394	343	63	2,690	7,300	503	1,280
31	241	.....	[a] 4,230	.....	2,090	.....	300	63	.....	3,040	.....	1,340
1908.												
1	932	332	[a] 833	3,200	5,590	5,910	137	81	63	49	[a] 108	212
2	906	[a] 504	713	2,910	4,860	5,050	121	[a] 101	65	45	82	123
3	811	558	749	2,090	[a] 3,400	3,020	116	71	63	62	81	78
4	705	754	809	1,130	4,500	2,230	111	61	57	[a] 67	82	98
5	[a] 643	709	744	[a] 1,320	3,390	1,660	[a] 145	69	104	65	91	101

[a] Sundays.
[b] Actual discharge measurement made September 19, 1907, showed a discharge of 189 second-feet.

Daily discharge in second-feet of Sandy River near Madison, Me., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
6	263	704	630	1,630	2,870	1,340	111	414	[a] 37	69	80	[a] 92
7	420	740	706	2,610	2,610	[a] 1,130	97	1,190	60	70	75	108
8	2,200	630	[a] 761	2,920	3,140	909	89	896	60	70	[a] 84	106
9	2,190	[a] 520	728	2,060	3,930	785	89	[a] 685	52	69	74	104
10	1,480	439	779	1,920	[a] 4,740	763	85	351	42	68	76	86
11	897	470	697	3,070	3,810	883	77	333	40	[a] 86	76	89
12	[a] 665	517	727	[a] 3,750	2,910	761	[a] 89	359	39	65	86	175
13	740	483	773	2,520	2,820	550	66	461	[a] 52	69	74	[a] 122
14	682	473	775	1,980	2,400	[a] 433	66	604	52	69	99	178
15	536	613	[a] 1,080	2,270	1,580	331	62	452	43	69	[a] 72	132
16	507	[a] 1,970	1,490	3,120	1,480	423	63	[a] 290	43	69	88	148
17	459	1,800	1,780	2,270	[a] 1,340	704	63	217	43	67	78	127
18	450	1,510	1,650	2,060	1,290	505	62	200	41	[a] 65	86	120
19	[a] 340	1,120	1,460	[a] 2,150	1,150	423	[a] 82	359	38	54	72	141
20	157	912	1,320	2,560	1,110	351	65	319	[a] 27	61	85	[a] 123
21	244	1,030	1,240	1,990	1,110	[a] 228	68	207	27	62	79	126
22	330	1,110	[a] 1,150	1,700	503	237	77	189	[b] 4.5	63	[a] 85	126
23	283	[a] 1,040	1,140	2,380	858	200	130	[a] 237	40	59	70	120
24	208	901	2,052	3,640	[a] 876	207	113	139	34	57	74	118
25	213	903	2,600	3,890	718	207	111	132	38	[a] 50	85	136
26	[a] 161	871	2,280	[a] 4,590	708	194	[a] 129	122	79	53	123	155
27	1,490	880	5,340	5,880	1,340	186	102	111	[a] 157	73	393	[a] 98
28	1,490	918	4,400	7,270	1,480	[a] 172	92	92	234	82	480	[c] 141
29	1,280	872	[a] 3,740	5,650	1,130	137	89	85	347	96	[a] 384	[c] 127
30	563	.....	3,060	3,930	961	143	85	[a] 123	630	109	234	[c] 141
31	169	.....	3,010	.....	[a] 4,320	.....	77	63	.....	125	.....	[c] 126

[a] Sundays.
[b] Actual discharge measurement. See list of measurements.
[c] Actual discharge measurements gave values as follows: December 28, 1908, 87 second-feet; December 29, 1908, 84 second-feet; December 30, 1908, 85 second-feet; December 31, 1908, 85 second-feet.

NOTE.—During the frozen periods 1907–8 the discharge was much affected by ice conditions. Flashboards were used most of the time during both years.

Monthly discharge of Sandy River near Madison, Me., for 1907–8.

[Drainage area, 650 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	549	241	365	0.562	0.65
February	206	93	146	.225	.23
March	4,230	87	462	.711	.82
April	11,600	1,430	4,080	6.28	7.01
May	9,620	646	2,770	4.26	4.91
June	2,600	80	836	1.29	1.44
July	2,660	90	628	.966	1.11
August	539	62	188	.289	.33
September	2,690	60	395	.608	.68
October	9,130	238	1,370	2.11	2.43
November	13,800	503	2,350	3.62	4.04
December	5,990	333	1,150	1.77	2.04
The year	13,800	60	1,230	1.89	25.69
1908.					
January	2,200	157	723	1.11	1.28
February	1,970	332	837	1.29	1.39
March	5,340	630	1,590	2.45	2.82
April	7,270	1,130	2,950	4.54	5.06
May	5,590	503	2,350	3.62	4.17
June	5,910	137	1,000	1.54	1.72
July	145	62	92.5	.142	.16
August	1,190	61	291	.448	.52
September	630	4.5	87.0	.134	.15
October	125	45	68.9	.106	.12
November	480	72	122	.188	.21
December	212	78	125	.192	.22
The year	7,270	4.5	853	1.31	17.82

NOTE.—Records of discharge at this station can only be classed as approximate. See description.

SEBASTICOOK RIVER AT PITTSFIELD, ME.

Sebasticook River rises in ponds in southeastern Somerset and western Penobscot counties, and flows in general southwestward for 45 miles to Kennebec River at Winslow, opposite Waterville. It is the largest tributary of the Kennebec, and it is also one of the most fully developed for power. Out of a total fall of 170 feet between Moose Pond and the Kennebec only about 50 feet remain undeveloped. Storage facilities are good, but have been only in part utilized. The basin is largely in farm lands.

The gaging station, which was established July 3, 1908, to obtain general statistical data regarding the total flow of the Sebasticook, is located at the steel highway bridge just above the Maine Central Railroad bridge across the river in the town of Pittsfield, Me.

About 800 feet upstream from the highway bridge is a dam which furnishes power to the Robert Dobson Company and the Smith Woolen Company; the dam of the Waverly Woolen mill is about one-half mile farther upstream. About 5 miles below the station and 2 miles from Burnham is the Sebasticook Power Company's dam. There is a clear fall below the gage, and the dam below has no effect on the discharge.

The gage datum has remained the same since the establishment of the station. Conditions are good for obtaining accurate discharge data, and a rating curve has been partly developed, but is withheld pending the collection of additional information.

Discharge measurements of Sebasticook River at Pittsfield, Me., 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec. ft.*
June 6	F. E. Pressey	108	205	3.68	486
1908.					
July 3	F. E. Pressey	106.5	175	3.26	362
July 23	do	105.5	172	3.22	322
September 21	do	100	140	3.06	231
November 4	Wood and French	98.5	154	2.96	224
December 24	F. E. Pressey	96	102	2.56	86.7

Daily gage height, in feet, of Sebasticook River at Pittsfield, Me., for 1908.

[Easter B. Morrill, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.75	2.85	2.75	2.55	2.85	16	.....	2.85	2.85	2.75	2.7	2.95
2	.....	2.7	2.85	2.7	2.85	2.75	17	.....	3.05	2.8	2.6	2.8	2.9
3	.....	2.95	2.85	2.55	2.85	3.0	18	.....	3.0	2.8	2.65	2.9	3.0
4	.....	2.9	2.85	2.55	3.0	2.9	19	.....	3.0	2.55	2.75	2.9	2.8
5	.....	2.9	2.6	2.8	2.95	2.6	20	.....	3.0	2.5	2.8	2.7	2.7
6	.....	2.95	2.6	2.8	2.8	2.4	21	.....	2.95	2.75	2.8	2.65	3.0
7	.....	2.95	2.85	2.85	2.6	2.8	22	.....	2.75	2.75	2.65	2.4	3.0
8	.....	2.7	2.85	2.8	2.5	3.0	23	.....	2.7	2.75	2.55	2.65	2.9
9	.....	2.7	2.85	2.8	2.7	2.95	24	.....	2.9	2.75	2.55	2.9	2.9
10	.....	2.95	2.85	2.6	2.9	2.9	25	.....	2.9	2.75	2.5	2.85	2.45
11	.....	2.95	2.85	2.65	2.9	2.85	26	.....	2.95	2.5	2.7	2.65	2.65
12	.....	2.9	2.6	2.9	2.8	2.5	27	2.95	2.95	2.45	2.8	2.6	2.45
13	.....	2.95	2.55	2.9	2.75	2.4	28	3.0	2.9	2.7	2.8	2.6	2.9
14	.....	3.1	2.8	2.85	2.65	2.75	29	3.0	2.7	2.75	2.8	2.3	2.8
15	.....	2.95	2.85	2.8	2.45	2.9	30	2.95	2.65	2.75	2.7	2.65	2.85
							31	2.9	2.8	.....	2.6	.....	2.8

NOTE.—Discharge in December probably not affected by ice conditions.

COBBOSSEECONTEE STREAM AT GARDINER, ME.

Cobbosseecontee Stream drains a group of lakes lying from 5 to 15 miles west of Augusta. From the largest of these, Cobbosseecontee Great Pond, which has an area of 8.4 square miles, the river flows southward, eastward, and then northeastward, entering Kennebec River at Gardiner. Its total drainage area, 240 square miles, is largely in farm lands. The aggregate area of the ponds at the head of the stream is about 19 square miles. From Lake Maranacook—one of the upper lakes—to the Kennebec the fall is 206 feet, about 128 feet of which occurs at Gardiner in the last three-fourths mile of the river course, where there are seven dams. The stream is quite fully developed for power and its excellent storage is very efficiently controlled, so that there is little waste of water.

Records of flow of Cobbosseecontee River have been kept at the dam of the Gardiner Water Power Company since 1890. This dam is the uppermost of a series of seven dams near the mouth of the river at Gardiner, and is of stone masonry, with a timber apron at the toe. The downstream face has an approximate slope of 1 horizontal to 4 vertical. The crest is horizontal and is about 6 feet wide. The upstream slope is about 1 vertical to 8 horizontal. The total length of the dam is about 100 feet, and flashboards 4.5 feet high are maintained continuously. The total head obtained is about 10 feet. The head-bay entrance is on the right bank, and from this runs a wooden penstock in which is placed a 39-inch Hercules wheel. In the head bay there is also a gatehouse with two gates which are kept partially open most of the time to regulate the proper flow down the river.

The records of flow are made up by considering (1) the flow over the dam, which is usually nothing, except for a short time in the spring; (2) the flow through the sluice gates, which is regulated by means of tables drawn up for the company by Hiram F. Mills, C. E., showing the discharge through the two gates for different pond level, the practical application of this method being to obtain a given flow at any time by setting these gates at the required gate opening, the flow through the wheel being taken into account; (3) the amount of water flowing through the 39-inch wheel, which is ascertained from this gate opening and pond level by means of a table, also provided for this purpose by Mr. Mills. The water that is pumped for the Gardiner supply is neglected in computations, being but a small percentage of the flow. It is also assumed that the tail water level remains constant. The leakage by the dam was measured during 1905 and found to be 10 second-feet, and correction made accordingly until August, 1907, when the dam was repaired. On Sundays and legal holidays gates are closed and no water is allowed to run unless the lake is full.

These records have been furnished by S. D. Warren & Co., through their engineer, Joseph A. Warren, and are considered excellent.

The maximum daily discharge since the establishment occurred March 12, 1903, and was 3,275 second-feet. The discharge for the minimum week (not including holidays or times when for some reason the plant was shut down) occurred October 23 to 29, 1899, and averaged 57 second-feet.

The Cobbosseecontee is a most remarkable example of the regularity of flow that can be obtained with proper storage, and except for a short time each spring there is usually no water wasted.

Data prior to 1907 have been compiled in Water-Supply Paper 198.

Daily discharge, in second-feet, of Cobbosseecontee Stream at Gardiner, Me., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	280	290	300	310	890	290	280	280	[a] 0	260	260	[a] 0
2	280	290	300	310	910	[a] 10	280	280	270	260	260	280
3	280	[a] 10	[a] 10	380	830	290	280	280	270	260	[a] 0	270
4	280	290	310	720	640	280	150	[a] 10	270	260	260	270
5	280	290	310	1,050	[a] 410	280	150	280	270	260	260	270
6	[a] 10	290	310	1,250	390	280	280	280	270	[a] 0	260	270
7	280	290	310	[a] 1,200	320	280	[a] 10	280	270	260	430	270
8	280	290	310	800	300	280	280	280	[a] 0	260	860	[a] 0
9	280	290	310	380	290	[a] 10	280	280	270	270	820	270
10	280	[a] 10	[a] 10	350	290	280	280	280	270	270	[a] 510	270
11	280	290	310	320	290	280	280	[a] 10	270	270	280	270
12	280	290	310	310	[a] 10	280	280	280	270	270	280	270
13	[a] 10	300	310	340	290	280	280	280	270	[a] 0	280	270
14	280	300	310	[a] 440	290	280	[a] 10	280	270	270	280	270
15	280	300	310	760	290	280	280	280	[a] 0	270	280	[a] 0

[a] Sundays.

Daily discharge, in second-feet, of Cobbosseecontee Stream at Gardiner, Me., for 1907-8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	280	300	310	1,020	290	[a] 10	280	280	270	270	280	270
17	280	[a] 10	[a] 10	1,100	290	280	280	280	270	270	[a] 0	270
18	280	300	310	1,150	290	280	280	[a] 10	270	270	280	270
19	280	300	310	1,180	[a] 10	280	280	280	270	270	280	270
20	[a] 10	300	310	950	290	280	280	280	270	[a] 0	280	270
21	290	300	310	[a] 500	290	280	[a] 10	280	270	270	280	270
22	290	300	310	600	290	280	280	280	[a] 0	270	280	[a] 0
23	290	300	310	480	290	[a] 10	280	280	240	270	280	280
24	290	[a] 10	[a] 10	370	290	280	280	280	240	270	[a] 0	300
25	290	300	310	630	290	280	280	[a] 0	240	270	280	150
26	290	300	310	1,670	[a] 10	280	280	270	240	270	280	140
27	[a] 15	300	310	1,690	290	280	280	270	260	[a] 0	280	290
28	290	300	310	[a] 1,500	290	280	[a] 10	270	260	270	140	290
29	290	.....	310	1,200	290	280	280	270	[a] 0	260	280	[a] 0
30	290	.....	310	980	150	[a] 10	280	270	260	260	280	290
31	290	.....	[a] 10	.....	290	.....	280	270	.....	260	.....	290
1908.												
1	290	300	[a] 365	730	955	145	270	270	270	250	[a] 0	140
2	290	[a] 0	375	865	1,720	410	270	[a] 0	270	250	180	140
3	290	300	385	985	[a] 1,820	815	270	270	270	250	180	140
4	290	300	385	960	1,820	960	145	270	270	[a] 0	180	140
5	[a] 10	300	385	[a] 895	1,750	960	[a] 10	270	270	210	180	125
6	280	300	385	890	1,430	960	270	270	[a] 0	210	170	[a] 0
7	280	300	385	870	1,100	[a] 925	270	270	270	210	160	120
8	460	300	[a] 385	500	980	840	270	270	270	210	[a] 0	130
9	590	[a] 0	385	325	710	565	270	[a] 0	270	210	160	140
10	510	300	385	335	[a] 330	300	270	270	270	210	160	140
11	514	300	385	340	455	290	270	270	270	[a] 0	160	140
12	[a] 570	300	380	[a] 340	560	280	[a] 0	270	270	200	160	140
13	950	300	360	335	735	280	270	270	[a] 0	190	160	[a] 0
14	970	300	340	320	730	[a] 0	270	270	270	185	160	140
15	930	300	[a] 340	310	560	280	270	270	260	180	[a] 0	140
16	880	[a] 300	340	300	410	280	270	[a] 0	260	180	160	140
17	620	730	340	300	[a] 0	280	270	270	260	180	160	140
18	365	945	340	290	280	280	270	270	260	[a] 0	160	140
19	[a] 270	960	340	[a] 0	280	280	[a] 0	270	260	180	160	140
20	300	970	340	280	280	280	270	270	[a] 0	180	160	[a] 0
21	300	930	310	285	280	[a] 0	270	270	260	180	160	140
22	310	870	[a] 310	280	280	280	270	270	260	180	[a] 0	140
23	310	[a] 820	330	280	280	280	270	[a] 0	260	180	160	140
24	300	800	415	280	[a] 0	275	270	270	260	180	150	140
25	300	720	650	280	280	270	270	270	260	[a] 0	140	70
26	[a] 0	500	730	[a] 0	280	270	[a] 0	270	250	180	70	30
27	300	315	575	280	280	270	270	270	[a] 0	180	140	[a] 0
28	310	350	485	280	280	[a] 0	270	270	250	180	140	140
29	300	390	[a] 590	285	280	270	270	270	250	180	[a] 0	140
30	300	.....	660	290	140	270	270	[a] 0	250	180	140	140
31	300	.....	715	.....	[a] 20	.....	270	270	.....	180	.....	140

[a] Sundays.

NOTE.—Leakage of dam until August, 1907, taken as 10 second-feet as determined by measurements made during 1905. Repairs were made to the dam during August, 1907, and after about August 20 there was no leakage.

Monthly discharge of Cobbosseecontee Stream at Gardiner, Me., for 1907–8.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	290	10	249	1.04	1.20
February	300	10	255	1.06	1.10
March	310	10	261	1.09	1.26
April	1,690	310	798	3.32	3.70
May	910	10	335	1.40	1.61
June	290	10	236	.983	1.10
July	280	10	237	.988	1.14
August	280	0	243	1.01	1.16
September	270	0	220	.917	1.02
October	270	0	232	.967	1.11
November	860	0	294	1.22	1.36
December	300	0	223	.929	1.07
The year	1,690	0	299	1.24	16.83
1908.					
January	970	0	409	1.70	1.96
February	970	0	466	1.94	2.09
March	730	310	422	1.76	2.03
April	985	0	424	1.77	1.98
May	1,820	0	623	2.60	3.00
June	960	0	386	1.61	1.80
July	270	0	231	.962	1.11
August	270	0	226	.942	1.09
September	270	0	228	.950	1.06
October	250	0	170	.708	0.82
November	180	0	130	.542	0.60
December	140	0	115	.479	0.55
The year	1,820	0	319	1.33	18.09

MISCELLANEOUS MEASUREMENTS IN KENNEBEC RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in Kennebec River drainage basin during 1907–8:

Miscellaneous discharge measurements made in Kennebec River drainage basin in 1907–8.

Date.	Stream.	Locality.	Width.	Area of section.	B. M. to W. S.	Discharge.
1907.			*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 15 [a]	Sebasticook River	Burnham, Me.	189	851	15.44	1,360
June 5 [b]	do	do	166	551	20.24	843
June 5 [a]	do	do	178	685	16.27	854
1908.						
September 21 [a]	Sebasticook River	Burnham, Me.	169	439	17.58	266

[a] Gaging made from railroad bridge. Reference point is top of bottom chord 5.5 feet from end inclined post on right bank, downstream truss.

[b] Gaging made from highway bridge. Reference point is top of guard rail of sidewalk 10 feet from right abutment, downstream side of bridge.

ANDROSCOGGIN RIVER DRAINAGE BASIN.

DESCRIPTION.

Androscoggin River is formed by the junction of Magalloway River and the outlet of the Umbagog-Rangeley Lakes near the Maine-New Hampshire boundary. For about 35 miles it flows southward in the State of New Hampshire, then turns abruptly and flows eastward in the State of Maine, finally turning toward the south and joining the Kennebec in Merrymeeting Bay, near Brunswick. The river is about 200 miles in length and the greatest width of its basin about 70 miles. The total drainage area is 3,470 square miles, about 80 per cent of which is in Maine. The only tributary of any importance is Little Androscoggin River, which enters at Lewiston.

The lower part of the basin is hilly and partially wooded, and much of it is in farm land, while the upper portion is very broken and mountainous and largely in forest. In general the elevation of the basin is greater than that of any other watershed on the Atlantic coast. Umbagog Lake is about 1,240 feet above mean tide, and Rangeley Lake about 1,500 feet. The sources of the Magalloway River reach elevations of from 2,600 to 2,900 feet.

Granite, gneiss, and mica schists are found along the main course of the river, with clay slate in the upper part of the basin. The bed of the river, like that of the Kennebec and Penobscot, is generally rocky where falls occur, with high banks little subject to overflow—conditions that are advantageous in the development of water power.

The mean annual precipitation is probably about 40 inches, varying from 43 inches near the coast to less than 35 inches in the extreme northern part of the basin. Winter conditions in the northern portions of the basin are extremely rigorous and low water frequently occurs during the winter months on this account.

The Androscoggin is naturally provided with storage facilities as fine as those of any river in the east. Including the Umbagog-Rangeley series, which afford a combined water surface of about 80 square miles and a storage of about 15 billion cubic feet lake surface, its total amounts to about 312 square miles. Under the efficient management of the Union Water Power Company the storage afforded by these lakes has had a marked effect upon the regimen of flow during low water for the past few years. A number of the companies on the river have united during the last year in making plans for a dam on the Magalloway River which will afford approximately 8 billion cubic feet of additional storage and very materially increase the low-water flow of the Androscoggin.

Androscoggin River is probably more fully developed, in respect to water power per square mile of drainage area, than any river in the

country. Of the 1,240 feet fall between Umbagog Lake and tide water more than 600 feet has been developed, furnishing power to many mills, including the cotton mills of Brunswick and Lewiston, and the great pulp and paper mills of Livermore Falls, Rumford Falls, and Berlin; but there still remain some excellent unutilized sites of especial value on account of the uniform regimen of flow of the river.

Androscoggin River is an important stream for log driving, but more care is taken in the use of water for this purpose than on any of the other streams in the State of Maine, and consequently there is little waste of water during the driving season.

Little Androscoggin River, about 30 miles in length, with a drainage area of about 380 square miles, is well endowed with storage facilities and is an important water-power stream for its size. Developments have been made at Mechanic Falls and near Auburn, and there is still considerable unutilized power.

The longest record of flow on the Androscoggin is that at Rumford Falls, extending back to 1892. The driest year since the beginning of the records was 1904, and the wettest 1893, the total flow during these two years being about in the ratio of 1 to 1.66.

The following gaging stations have been maintained in this river basin:

Androscoggin at Gorham, N. H. (1903) fragmentary.
Androscoggin River at Shelburne, N. H. (1903–1907).
Androscoggin River at Rumford Falls, Me. (1892–1908).
Androscoggin River at Dixfield, Me. (1902–1908).

RIVER SURVEYS IN ANDROSCOGGIN DRAINAGE BASIN.

Surveys have been made of Androscoggin River by the United States Geological Survey, as follows:

From tide water at Brunswick to Livermore Falls; survey for profile only.
From Livermore Falls to Umbagog Lake at Errol Dam; for plan and profile.

The results of these surveys are being prepared for publication, and eventually may be had on application to the Director of the United States Geological Survey.

ANDROSCOGGIN RIVER AT SHELBURNE, N. H.

This station is located at the steel highway bridge about one-half mile north of the railway station at Shelburne, N. H., and was established May 30, 1903, to obtain general statistical and comparative data regarding the flow of the river. It was discontinued April 30, 1907.

It is about 5¾ miles below the mouth of Peabody River and about 6 miles above Wild River. The nearest developed power upstream is at the Lead Mine Bridge power station of the Berlin Mills Company—a plant constructed during 1906—about 2 miles distant. Down-stream the first dam is at Rumford Falls.

The gage datum has remained the same during the maintenance of the station. During the winter months the discharge is affected by the ice. Conditions for obtaining accurate discharge at medium and high stages are good, and a good rating curve has been developed within these limits. At low water conditions are poor for gagings and results approximate.

Daily gage height, in feet, of Androscoggin River at Shelburne, N. H., for 1907.

[James Simpson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Jan.	Feb.	Mar.	Apr.	May.
1				5.2	9.5	16				4.4	
2				5.1		17		6.7	6.7	4.3	
3		6.6	6.8	4.7		18				4.3	
4				4.7		19				4.4	
5				4.45		20	6.7			4.4	
6	6.8			4.6		21				4.3	
7				4.5		22				4.3	
8				4.5		23				4.4	
9				4.5		24		6.85	6.5	6.2	
10		6.65	6.75	4.5		25				6.3	
11				4.5		26				6.15	
12				4.5		27	6.5			6.5	
13	6.9			4.5		28				6.8	
14				4.4		29				7.55	
15				4.45		30				8.75	
						31			5.1		

NOTE.—River frozen January 1 to March 31. During the frozen period gage heights were taken to water surface in a hole in the ice.

Rating table for Androscoggin River at Shelburne, N. H., for 1903–1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.90	1,100	5.10	3,105	6.30	6,000	8.00	10,930
4.00	1,212	5.20	3,325	6.40	6,265	8.20	11,550
4.10	1,336	5.30	3,545	6.50	6,535	8.40	12,170
4.20	1,472	5.40	3,775	6.60	6,810	8.60	12,790
4.30	1,618	5 50	4,005	6.70	7,090	8.80	13,410
4.40	1,774	5.60	4,240	6.80	7,375	9.00	14,030
4.50	1,938	5.70	4,480	6.90	7,660	9.20	14,670
4.60	2,110	5.80	4,725	7.00	7,950	9.40	15,310
4.70	2,290	5.90	4,970	7.20	8,530	9.60	15,950
4.80	2,480	6.00	5,225	7.40	9,130		
4.90	2,680	6.10	5,480	7.60	9,730		
5.00	2,890	6.20	5,740	7.80	10,330		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made during 1903–1906, and is well defined between gage heights 4.3 feet and 7.7 feet.

Monthly discharge of Androscoggin River at Shelburne, N. H., for 1907.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			1,000	0.667	0.77	C.
February			900	.600	.62	C.
March			1,300	.867	1.00	C.
April	13,300	1,620	3,330	2.22	2.48	B.
May 1	15,600					

NOTE.—Discharge January to March determined from discharge at Rumford Falls and climatological reports.

ANDROSCOGGIN RIVER AT RUMFORD FALLS, ME.

The discharge of Androscoggin River at Rumford Falls since 1892 has been computed and furnished by Charles A. Mixer, engineer for the Rumford Falls Power Company, by adding the actual measured quantities passing through the wheels to the computed flow over the dam, using the customary Francis weir formula with modified coefficient.

At Rumford Falls is one of the finest water powers on the Atlantic coast. Here the Androscoggin descends 177 feet in a mile in several pitches over granite ledges. A comprehensive plan of development for the use of power from three levels has been laid out and partly executed. From the high-level canal there is a fall of 97 feet to the middle level, which also receives a direct and independent supply of water from the river. The water in the middle-level canal is then used and discharged, after a fall of 50 feet, into the low-level canal, from which, in turn, there is a final drop of 30 feet to the river. Dams have been built at the entrance of the high and middle level canals.

At present about 19,000 gross horsepower are utilized at Rumford Falls, largely in the manufacture of pulp and paper. The total comprises some 40,000 gross horsepower, under present conditions of storage in the Rangeley Lake system. Further storage will probably be available in a few years and add still more to the value of this privilege, which is only about 85 miles by rail from Portland and has excellent transportation facilities.

The maximum daily discharge occurred April 15, 1895, and was about 55,200 second-feet. The discharge for the minimum week occurred February 15 to 21, 1904, and averaged 686 second-feet.

Daily discharge, in second-feet, of Androscoggin River at Rumford Falls, Me., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1,592	1,319	1,348	6,104	23,834	3,617	6,756	3,076	[a] 1,613	5,279	5,783	[a] 2,116
2	1,720	1,378	1,362	4,732	19,312	[a] 3,720	5,550	2,880	1,668	3,938	5,490	2,043
3	1,678	[a] 1,456	[a] 1,352	4,131	14,816	3,822	4,556	2,796	1,724	3,335	[a] 23,019	2,686
4	1,636	1,408	1,282	4,037	13,465	3,865	3,733	[a] 3,070	2,327	3,367	16,811	2,482
5	1,772	1,494	1,387	4,103	[a] 12,231	3,584	3,758	3,343	3,067	4,547	9,210	2,265
6	[a] 1,870	1,434	1,450	4,072	11,085	4,736	3,301	3,071	3,273	[a] 3,399	10,269	2,418
7	1,824	1,451	1,486	[a] 3,875	9,756	4,209	[a] 2,811	2,676	2,401	2,434	22,771	2,711
8	1,858	1,434	1,518	3,770	9,988	3,800	3,141	2,541	[a] 2,224	4,351	16,759	[a] 2,569
9	1,742	1,471	1,552	3,376	10,780	[a] 3,473	2,951	2,398	1,642	6,207	12,320	2,600
10	1,626	[a] 1,445	[a] 1,451	2,916	10,781	3,718	2,852	2,305	2,019	4,552	[a] 10,745	4,601
11	1,631	1,447	1,528	3,251	10,338	3,723	2,786	[a] 2,027	1,895	3,591	10,760	14,933
12	1,631	1,460	1,570	3,207	[a] 8,696	3,375	2,810	1,937	4,517	4,319	9,414	9,940
13	[a] 1,547	1,388	1,538	3,206	8,165	3,220	3,003	2,003	3,045	[a] 4,645	7,447	3,680
14	1,514	1,388	1,530	[a] 3,227	9,946	3,189	[a] 2,732	1,872	2,535	5,269	6,495	3,170
15	1,578	1,402	1,546	3,248	9,875	3,241	2,861	1,813	[a] 2,202	4,824	5,493	[a] 3,083
16	1,479	1,404	1,534	3,078	9,912	[a] 3,278	2,665	1,738	1,820	4,321	5,096	3,126
17	1,422	[a] 1,401	[a] 1,488	3,095	12,092	3,314	2,451	1,434	2,275	4,094	[a] 3,925	3,767
18	1,411	1,329	1,582	3,163	10,591	2,951	2,448	[a] 1,487	1,971	3,873	4,319	3,432
19	1,457	1,419	1,690	3,406	[a] 9,551	3,030	2,338	1,602	1,916	3,566	4,339	3,211
20	[a] 1,424	1,357	1,609	3,365	10,233	4,670	2,106	1,581	1,782	[a] 3,005	3,981	2,975
21	1,502	1,367	1,534	[a] 3,248	8,916	4,621	[a] 2,065	1,427	1,800	2,380	3,461	3,009
22	1,644	1,329	1,442	3,131	8,300	3,892	1,998	1,520	[a] 1,685	2,813	3,451	[a] 2,605
23	1,527	1,339	1,641	4,160	7,567	[a] 3,554	2,217	1,545	1,329	2,715	3,418	3,043
24	1,469	[a] 1,279	[a] 1,855	12,045	6,472	3,215	2,267	1,629	2,624	2,522	[a] 3,082	4,703
25	1,398	1,211	1,957	11,332	5,259	3,157	2,373	[a] 1,575	3,098	2,390	3,175	4,545
26	1,392	1,337	1,932	9,222	[a] 4,970	4,227	2,434	1,398	2,802	2,344	3,716	4,109
27	[a] 1,370	1,323	1,819	11,542	4,681	4,794	2,788	1,643	2,440	[a] 2,107	3,234	3,640
28	1,285	1,338	1,904	[a] 11,809	4,766	3,866	[a] 2,553	1,602	2,258	5,413	3,118	3,671
29	1,409	.....	3,198	12,697	4,484	3,276	2,530	1,745	[a] 2,735	14,016	3,037	[a] 3,223
30	1,355	.....	5,819	17,943	4,069	[a] 5,016	2,502	1,812	7,171	12,067	2,899	3,185
31	1,316	.....	[a] 7,224	.....	3,885	.....	2,777	1,814	.....	7,089	.....	3,247
1908.												
1	2,909	2,345	[a] 2,644	6,454	18,696	10,892	1,567	1,562	1,240	1,621	[a] 1,249	1,677
2	2,912	[a] 2,276	2,610	5,987	17,017	8,913	1,785	[a] 1,695	1,388	1,707	1,138	1,350
3	2,755	2,207	2,662	5,278	[a] 12,282	7,256	1,645	1,309	1,519	1,727	1,473	748
4	2,500	2,358	2,602	4,409	11,584	7,197	1,600	1,286	1,493	[a] 1,637	1,487	1,012
5	[a] 2,537	2,173	2,663	[a] 3,828	10,370	7,156	[a] 1,400	1,438	1,511	1,591	1,600	1,383
6	1,954	2,245	2,656	5,004	9,638	6,357	1,320	3,089	[a] 1,411	1,595	1,500	[a] 1,177
7	2,657	2,272	2,606	6,433	8,660	[a] 5,148	1,942	3,017	1,332	1,586	1,533	1,134
8	2,822	2,242	[a] 2,305	6,340	8,457	5,047	1,947	2,158	1,190	1,567	[a] 1,285	1,200
9	3,212	[a] 2,117	2,634	5,184	9,251	4,679	1,990	[a] 1,781	1,380	1,503	1,425	1,341
10	2,932	1,992	2,618	5,013	[a] 10,349	4,034	1,903	1,454	1,423	1,540	1,484	1,220
11	2,771	2,362	2,501	5,800	10,823	3,603	1,536	1,580	1,386	[a] 1,471	1,547	1,117
12	[a] 2,720	2,409	2,552	[a] 5,956	10,256	3,457	[a] 1,259	1,971	1,370	1,677	1,566	1,155
13	2,613	2,425	2,535	5,240	10,673	3,452	1,264	1,847	[a] 1,438	1,593	1,552	[a] 1,240
14	2,735	2,446	2,642	4,740	10,026	[a] 3,217	1,554	1,922	1,190	1,566	1,526	1,260
15	2,545	2,626	[a] 2,707	5,029	8,769	3,183	1,397	1,593	1,380	1,582	[a] 1,555	1,338
16	2,596	[a] 5,984	3,617	6,781	8,780	4,020	1,392	[a] 1,600	1,423	1,509	1,485	1,183
17	2,289	5,361	3,949	5,144	[a] 8,699	4,442	1,521	1,176	1,386	1,586	1,501	1,110
18	2,440	3,854	3,370	4,674	8,629	3,907	1,906	1,426	1,370	[a] 1,489	1,382	1,038
19	[a] 2,264	3,180	2,916	[a] 5,174	8,507	3,628	[a] 1,864	1,475	1,438	1,534	1,358	1,052
20	2,088	3,041	2,626	5,350	8,203	3,019	2,783	1,487	[a] 1,217	1,558	1,442	[a] 1,132
21	2,460	2,892	3,049	4,612	7,089	[a] 3,051	2,603	1,483	1,192	1,518	1,374	1,022
22	2,601	3,243	[a] 2,446	4,194	6,389	3,082	2,022	1,471	1,390	1,594	[a] 1,444	1,119
23	2,526	[a] 2,663	2,922	4,094	6,480	2,921	1,717	[a] 1,310	1,287	1,512	1,346	995
24	2,518	2,748	3,831	8,838	[a] 5,488	2,677	1,659	1,149	1,334	1,463	1,513	935
25	2,445	2,735	4,476	8,334	5,073	2,234	1,592	1,390	1,381	[a] 1,404	1,572	924
26	[a] 2,442	2,647	4,055	[a] 11,561	4,939	2,352	[a] 1,787	1,287	1,444	1,450	1,733	950
27	2,680	2,684	5,221	13,649	5,568	2,281	1,761	1,375	[a] 1,403	1,518	2,080	[a] 1,093
28	3,103	2,674	8,097	15,667	5,683	[a] 1,625	1,845	1,331	1,388	1,542	1,949	987
29	2,867	2,679	[a] 9,898	15,894	5,589	1,738	1,685	1,346	1,761	1,581	[a] 1,702	980
30	2,599	.....	7,987	13,049	6,078	2,093	1,713	[a] 1,330	1,719	1,636	1,553	972
31	2,282	.....	6,387	.....	[a] 11,935	.....	1,780	1,315	.....	1,471	.....	909

[a] Sundays.

Monthly discharge of Androscoggin River at Rumford Falls, Me., for 1907–8.

[Drainage area, 2,090 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	1,870	1,280	1,550	0.742	0.86
February	1,490	1,210	1,390	.665	.69
March	7,220	1,280	1,940	.928	1.07
April	17,900	2,920	5,680	2.72	3.04
May	23,800	3,880	9,640	4.61	5.32
June	5,020	2,950	3,740	1.79	2.00
July	6,760	2,000	2,970	1.42	1.64
August	3,340	1,400	2,040	.976	1.13
September	7,170	1,330	2,460	1.18	1.32
October	14,000	2,110	4,480	2.14	2.47
November	23,000	2,900	7,570	3.62	4.04
December	14,900	2,040	3,770	1.80	2.08
The year	23,800	1,210	3,940	1.88	25.66
1908.					
January	3,210	1,950	2,610	1.25	1.44
February	5,980	1,990	2,790	1.33	1.43
March	9,900	2,300	3,670	1.76	2.03
April	15,900	3,830	6,920	3.31	3.69
May	18,700	4,940	9,030	4.32	4.98
June	10,900	1,620	4,220	2.02	2.25
July	2,780	1,260	1,730	.828	.95
August	3,090	1,150	1,600	.765	.88
September	1,760	1,190	1,390	.665	.74
October	1,730	1,400	1,560	.746	.86
November	2,080	1,140	1,510	.722	.81
December	1,680	748	1,120	.536	.62
The year	18,700	748	3,180	1.52	20.68

ANDROSCOGGIN RIVER AT DIXFIELD, ME.

This station was established August 22, 1902, to obtain general statistical and comparative data regarding the flow of Androscoggin River, and was discontinued July 1, 1908.

It was located about one-half mile west of Dixfield which is situated just above the confluence of Webbs River, at the highway bridge on the road to West Peru.

It is about 4½ miles below the large development at Rumford Falls. During the winter months the discharge is affected by ice. Conditions for obtaining accurate discharge data are good, and a fairly good rating curve has been developed for low and medium stages. The curve has not been developed for high stages. The gage datum has remained the same during the maintenance of the station.

Daily gage height, in feet, of Androscoggin River at Dixfield, Me., for 1907–8.

[S. F. Robinson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	.....	.....	10.15	14.75	9.1	10.05	8.55	7.75	9.6	9.85	8.4
2	.....	.....	.....	9.75	13.95	8.95	9.8	8.5	7.95	9.15	9.6	8.3
3	.....	8.3	9.3	9.5	12.55	9.0	9.35	8.45	8.15	8.85	13.9	8.45
4	.....	.....	.....	9.3	12.1	9.1	9.15	8.45	8.25	8.7	13.75	8.15
5	8.5	.....	.....	9.25	11.6	9.05	8.9	8.65	8.5	9.55	10.9	8.5
6	.....	.....	.....	9.35	11.4	9.45	8.85	8.6	8.55	8.9	10.5	8.45
7	8.3	.....	.....	9.25	11.05	9.4	8.7	8.45	8.35	8.25	14.05	8.5
8	8.2	.....	.....	9.15	11.0	9.05	8.65	8.4	8.15	8.55	13.45	8.4
9	8.2	.....	.....	8.95	11.3	9.0	8.7	8.35	7.65	10.1	11.65	8.3
10	.....	8.3	9.3	8.7	11.3	9.0	8.5	8.25	8.0	9.4	11.4	8.7
11	.....	.....	.....	8.8	11.15	9.05	8.5	8.1	8.0	9.0	11.05	12.35
12	.....	.....	.....	9.0	10.7	8.95	8.5	8.05	9.3	9.15	10.6	11.1
13	9.5	.....	.....	8.85	10.5	8.95	8.55	8.15	8.7	9.4	10.35	9.6
14	.....	.....	.....	8.8	10.9	8.8	8.35	8.0	8.35	9.4	10.0	8.9
15	.....	.....	.....	8.8	11.0	8.75	8.45	8.0	8.15	9.3	9.75	9.05
16	.....	.....	.....	8.85	10.9	8.65	8.4	7.95	7.85	9.1	9.45	8.8
17	.....	9.2	8.25	8.95	11.55	8.65	8.25	7.75	8.2	9.0	9.35	8.95
18	.....	.....	8.05	8.9	11.2	8.65	8.2	7.55	8.05	8.95	8.9	8.8
19	9.3	.....	8.2	8.95	10.9	8.6	8.25	7.7	8.0	8.8	9.25	8.9
20	.....	.....	8.05	8.9	11.0	8.95	8.05	7.9	7.9	8.5	9.05	8.9
21	.....	.....	8.1	8.75	10.75	9.4	8.05	7.65	7.9	8.0	8.8	8.65
22	.....	.....	7.95	8.8	10.5	9.05	7.95	7.7	7.9	8.5	8.8	8.8
23	.....	.....	8.1	9.25	10.3	8.8	8.15	7.8	7.7	8.45	8.8	8.5
24	.....	9.1	8.25	11.3	9.9	8.65	8.1	7.8	8.0	8.35	8.7	9.1
25	.....	.....	8.15	12.0	9.65	8.65	8.1	7.8	8.75	8.25	8.65	9.45
26	.....	.....	8.4	11.5	9.5	9.15	8.2	7.65	8.55	8.15	8.85	9.3
27	8.2	.....	8.25	11.6	9.35	9.35	8.6	7.9	8.35	8.15	8.7	9.05
28	.....	.....	8.25	11.5	9.4	9.05	8.25	7.85	8.2	8.4	8.6	8.9
29	.....	.....	8.65	12.4	9.35	8.75	8.2	7.85	8.3	12.2	8.55	9.2
30	.....	.....	9.8	13.05	9.2	8.9	8.3	7.9	10.25	11.9	8.45	8.85
31	.....	.....	10.6	.....	9.1	.....	8.3	7.85	.....	10.85	.....	8.7

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.[b]							1908.[b]						
1	8.9	11.0	10.8	9.9	12.95	11.6	16	9.8	11.0	9.0	10.15	10.7	9.1
2	8.8	11.1	10.7	9.85	13.6	10.75	17	11.6	11.0	9.35	9.65	10.7	9.4
3	8.55	11.0	.....	9.8	12.45	10.4	18	.....	10.9	9.3	9.65	10.65	9.1
4	8.35	10.9	10.8	9.85	11.4	10.1	19	.....	11.0	9.05	9.65	10.45	9.05
5	8.35	11.0	10.8	9.05	11.05	10.1	20	.....	11.1	8.8	9.85	10.35	8.8
6	8.25	11.1	10.6	9.4	10.9	10.05	21	.....	10.9	8.55	9.5	10.2	8.5
7	8.65	11.1	10.3	9.3	10.65	9.8	22	.....	11.0	8.4	9.3	9.9	8.55
8	8.65	11.1	10.3	10.15	10.6	9.45	23	.....	11.0	8.55	9.15	10.0	8.7
9	8.95	10.9	10.1	9.85	10.75	9.55	24	.....	11.1	9.0	10.2	9.8	8.55
10	9.05	11.0	10.1	9.6	11.25	9.3	25	10.1	10.9	9.4	10.7	9.55	8.2
11	9.05	11.1	10.1	9.95	11.15	9.1	26	.....	11.0	9.3	11.8	9.45	8.15
12	9.0	11.1	9.7	10.1	11.2	8.95	27	9.7	10.9	9.45	12.15	9.8	8.15
13	8.45	11.0	9.5	9.8	11.05	8.8	28	10.5	10.9	10.3	12.55	9.8	7.7
14	8.4	11.0	9.2	9.4	11.05	8.65	29	10.2	10.9	10.9	12.65	9.65	8.0
15	9.8	10.9	9.0	9.45	10.55	8.65	30	10.5	.....	10.6	12.35	9.8	8.05
							31	10.7	.....	9.95	.....	11.45	.....

[a] Ice conditions during January, February, and March, 1907. Discharge not affected by ice conditions December, 1907. During the frozen seasons, 1907–8, gage heights are to water surface in a hole cut in the ice.
[b] Ice conditions from January 6 to March 20, 1908.

Rating table for Androscoggin River at Dixfield, Me., for 1906–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
7.50	1,430	8.80	3,970	10.10	8,700	11.80	16,940
7.60	1,540	8.90	4,270	10.20	9,130	12.00	18,000
7.70	1,660	9.00	4,580	10.30	9,560	12.20	19,060
7.80	1,790	9.10	4,900	10.40	10,000	12.40	20,130
7.90	1,940	9.20	5,230	10.50	10,450	12.60	21,210
8.00	2,100	9.30	5,580	10.60	10,900	12.80	22,300
8.10	2,280	9.40	5,940	10.70	11,360	13.00	23,400
8.20	2,480	9.50	6,310	10.80	11,830	13.20	24,500
8.30	2,690	9.60	6,690	10.90	12,310	13.40	25,600
8.40	2,910	9.70	7,080	11.00	12,800	13.60	26,720
8.50	3,150	9.80	7,470	11.20	13,810	13.80	27,840
8.60	3,410	9.90	7,870	11.40	14,840	14.00	28,960
8.70	3,680	10.00	8,280	11.60	15,880	15.00	34,660

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 12 discharge measurements made during 1903–1906, and is well defined below gage height 11 feet.

Monthly discharge of Androscoggin River at Dixfield, Me., for 1907–8.

[Drainage area, 2,230 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,250	1,550	1,870	0.839	0.97	A.
February	1,800	1,450	1,680	.753	.78	A.
March	10,000	1,550	2,340	1.05	1.21	A.
April	23,700	3,680	7,860	3.52	3.93	B.
May	33,200	4,900	12,700	5.70	6.57	B.
June	6,120	3,410	4,490	2.01	2.24	A.
July	8,490	2,020	3,380	1.52	1.75	A.
August	3,540	1,480	2,270	1.02	1.18	B.
September	9,340	1,600	2,770	1.24	1.38	B.
October	19,100	2,100	5,450	2.44	2.81	A.
November	29,200	3,030	9,710	4.35	4.85	A.
December	19,900	2,380	4,800	2.15	2.48	A.
The year	33,200	1,450	4,940	2.22	30.15	
1908.						
January	4,270	2,350	3,160	1.42	1.64	A.
February	7,200	2,400	3,360	1.51	1.63	A.
March	12,300	2,770	4,530	2.03	2.34	A.
April	21,500	4,740	9,310	4.17	4.65	B.
May	26,700	6,120	11,800	5.29	6.10	B.
June	15,900	1,660	5,350	2.40	2.68	A.

NOTE.—Discharge during the winter periods based on the discharge at Rumford Falls.

	Second feet.
Discharge January 6 to 31, 1908	3,110
March 1 to 20, 1908	3,400

MISCELLANEOUS MEASUREMENTS IN ANDROSCOGGIN RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in Androscoggin River drainage basin during 1908:

Miscellaneous discharge measurements made in Androscoggin River drainage basin in 1908.

Date.	Stream.	Locality.	Width.	Area of section.	Gage height.	Discharge.
			Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 22	Little Androscoggin River.	Near Oxford, Me	62	139	[a] 19.61	78
Do	do	Four Street bridge in Oxford, Me.	38	56.4	[b] 23.46	64
September 11	do	Mechanic Falls, Me	97	177	([c])	152

[a] Bench mark is top of top board of side of bridge, 71 feet from initial point. Initial point is shore edge of end post, downstream truss, left abutment.

[b] Bench mark is top of horizontal tie plank, 30 feet from initial point and 2 feet from top of lower chord. Initial point is shore edge of end post, downstream truss, right abutment.

[c] Head gage read +32 inches; tail-water gage read −1 foot (normal); height of flashboards 29 inches. Zero of tail-water gage is top of flashboards of Poland Paper Company's dam. Crest of dam to zero of tail-water gage, 13 feet. Gate opening of No. 2 gate, $\frac{5}{16}$.

PRESUMPSCOT RIVER DRAINAGE BASIN.

DESCRIPTION.

Presumpscot River, the outlet of Sebago Lake, rises about 17 miles northwest of Portland. The principal tributary of the lake is Crooked River, a stream heading 35 miles farther north and within 3 miles of the Androscoggin. The area of the lake is 46 square miles. The total water surface in the drainage basin is 97 square miles. The area of the drainage basin at the outlet of the lake is 420 square miles, and at the mouth of the river 600 square miles.

The northern part of the basin is mountainous and wooded; the southern part is moderately hilly and mostly in farm land. Granite, gneiss, and mica-schists appear in many places, and the soil is gravelly and sandy. The fall from Sebago Lake to tide water is about 265 feet in a distance of nearly 22 miles, or an average of about 12 feet per mile.

The mean annual precipitation is probably about 42 inches. The river and lake generally freeze over during the winter.

Sebago Lake is a magnificent natural storage reservoir, and its utilization for this purpose has made the regimen of flow of the Presumpscot extremely regular. Nowhere in the United States is there a better example of efficient regulation of storage than on the Presumpscot.

A record of flow from Sebago Lake has been kept since 1887. During this period of over twenty years the driest season was that of 1905, and the wettest 1891, the total flow for these two years being about in the ratio of 1 to 2.22.

PRESUMPSCOT RIVER AT OUTLET OF SEBAGO LAKE, ME.

Since January, 1887, the flow from Sebago Lake has been regularly recorded, the quantity being deduced during most of this time from the openings in the gates at the dam, the discharging capacity of which under different conditions of head has been determined and tabulated by Hiram F. Mills, of Lowell. In March, 1904, S. D. Warren & Co. completed a hydroelectric plant at Eel Weir Falls, near Sebago Lake, bringing water directly from the dam at the lake by means of a canal. A head of 40 feet is thus obtained at average lake level.

The development at Eel Weir has necessitated a different method of recording the flow from the lake. The water is used through three pairs of 33-inch Hercules wheels. The water used by these wheels is recorded by three Allen meters, one on each pair. These meters were rated by the result of a test at Holyoke of one pair of these wheels.

Since the station was finished the performance of the wheels and of the recording meters has been checked by careful current-meter readings in the canal and brake tests of the wheels, combined with electrical readings of the generator output. The records of the generator output of the station are kept and the constant ratio between these readings and the Allen meter records gives a good check on the latter.

It is usually desired to keep a constant flow through the canal, and when demands for power are not sufficient to utilize the entire flow through the wheels the excess of water is run off through a pair of regulating gates at the power station, a record of the openings of these gates being kept and the flow computed from a coefficient determined by current-meter tests.

The flow at times from the lake may be greater than it is safe to carry through the canal, though this has not as yet happened. At such times it will be necessary to draw part of the water through the old regulating gates in the main dam.

A continuous record of the Sebago Lake level has been kept since January, 1872. The lake fills rapidly after March 1, attaining its maximum height between the middle of April and June 1, and then gradually subsides as water is withdrawn for mill purposes, until a minimum stage is reached—sometimes in the autumn but usually in the winter.

The records of lake level and discharge make an unusually complete and valuable series of data. These have been furnished from time to time by S. D. Warren & Co., and the data regarding the new methods of measurement, etc., is from a description furnished by Joseph A. Warren.

The maximum daily discharge occurred from April 25 to May 7, 1898, and was a continuous flow of 2,000 second-feet. The discharge for the minimum week (not considering periods when for some reason the plant was not running) occurred March 17 to 23, 1907, and averaged 256 second-feet.

Daily discharge, in second-feet, of Presumpscot River at outlet of Sebago Lake, Me., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	520	517	333	317	417	550	550	500	a 263	407	540	a 259
2	522	522	333	267	417	a 417	547	488	275	405	540	677
3	522	a 417	a 228	267	417	550	543	463	275	463	a 225	670
4	522	522	350	267	408	550	368	a 333	275	552	542	672
5	522	522	350	285	a 282	547	570	427	275	448	542	672
6	a 382	522	350	272	417	550	493	433	275	a 215	542	673
7	522	522	350	a 173	417	550	a 385	427	275	542	542	647
8	522	522	350	272	417	550	547	432	a 272	542	545	a 272
9	500	522	350	290	417	a 375	548	427	333	542	545	668
10	515	a 335	a 225	328	417	550	545	430	337	542	a 398	665
11	522	518	345	418	417	550	547	a 370	335	542	685	670
12	513	518	345	417	a 342	550	547	437	337	542	686	670
13	a 393	517	345	418	548	552	547	437	337	a 231	684	671
14	522	517	342	a 317	548	552	a 410	437	337	543	664	663
15	522	508	283	418	550	552	540	450	a 308	540	674	a 438
16	522	517	267	420	550	a 367	538	435	337	540	661	672
17	522	a 325	a 192	417	552	552	548	435	357	540	a 332	672
18	522	517	267	418	552	552	553	a 347	433	542	691	677
19	522	517	267	415	a 350	552	588	433	373	542	680	670
20	a 417	517	267	400	552	552	593	433	408	a 270	678	670
21	522	517	267	a 300	552	552	a 308	443	400	538	677	680
22	517	515	267	417	550	552	500	433	a 258	538	672	a 268
23	517	515	267	418	550	a 439	495	433	387	540	647	677
24	520	a 263	a 208	417	553	550	497	433	382	540	a 433	677
25	522	333	267	427	551	547	503	a 373	393	542	670	675
26	522	433	283	425	a 445	520	503	412	405	502	668	662
27	a 427	333	325	413	550	513	493	373	410	a 268	660	672
28	522	333	333	a 287	552	540	a 408	373	402	540	660	668
29	522	.....	333	415	550	535	500	373	a 160	540	672	a 272
30	522	.....	333	417	485	a 433	500	373	403	553	663	667
31	522	.....	a 167	.....	550	.....	493	373	.....	540	.....	667
1908.												
1	668	725	a 500	613	400	550	733	650	817	800	a 392	668
2	667	a 542	810	662	242	783	717	a 333	817	783	733	680
3	668	817	820	625	a 158	788	400	767	817	617	750	682
4	667	817	820	292	533	808	67	750	783	a 325	742	695
5	a 318	817	820	a 217	633	825	a 200	750	617	800	750	650
6	745	795	800	667	667	150	333	767	a 442	800	750	a 417
7	723	893	533	733	667	a 280	333	750	750	800	583	650
8	558	800	a 333	717	517	725	333	700	783	800	a 333	553
9	657	a 450	817	550	233	750	333	a 300	783	800	742	593
10	720	817	822	617	a 83	775	333	750	783	633	750	605
11	742	822	820	233	683	817	167	742	783	a 267	758	562
12	a 200	823	818	a 150	800	825	a 200	550	725	792	758	580
13	668	820	758	617	817	275	733	650	a 467	783	750	a 422
14	750	823	328	667	817	a 258	750	683	783	800	625	608
15	750	717	a 103	667	817	733	750	650	783	800	a 430	607
16	750	a 467	585	667	267	825	733	a 375	733	792	750	628
17	750	812	525	633	a 117	800	750	782	783	700	750	610
18	742	820	525	283	748	792	700	782	783	a 358	733	612
19	a 383	822	600	a 158	825	700	a 358	767	667	817	717	617
20	750	817	553	550	825	300	750	783	a 400	817	642	a 392
21	750	822	267	617	825	a 262	750	783	792	800	625	622
22	750	808	a 58	675	825	733	750	667	792	783	a 443	642
23	750	a 542	615	675	254	817	750	a 367	800	767	768	625
24	750	812	470	683	a 167	817	750	817	792	650	762	625
25	730	818	515	225	770	817	617	817	792	a 383	717	608

a Sundays.

Daily discharge, in second-feet, of Presumpscot River at outlet of Sebago Lake, Me., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
26	[a] 408	813	550	[a] 150	825	692	[a] 217	817	583	742	667	617
27	792	820	578	600	825	350	750	817	[a] 342	717	678	[a] 350
28	817	822	278	567	825	[a] 308	750	817	783	742	665	583
29	708	733	[a] 42	517	825	800	817	700	800	750	[a] 400	583
30	800	.....	467	667	300	767	817	[a] 367	783	583	680	550
31	817	.....	608	.....	[a] 58	.....	800	800	.....	633	.....	550

[a] Sundays.

Monthly discharge of Presumpscot River at outlet of Sebago Lake, Me., for 1907–8.

[Drainage area, 420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	522	382	505	1.20	1.38
February	522	263	469	1.12	1.17
March	350	167	296	.705	.81
April	427	173	358	.852	.95
May	553	282	480	1.14	1.31
June	552	367	523	1.25	1.40
July	593	308	507	1.21	1.40
August	500	333	418	.995	1.15
September	433	160	334	.795	.89
October	553	215	488	1.16	1.34
November	691	225	594	1.41	1.57
December	680	259	611	1.45	1.67
The year	691	160	465	1.11	15.04
1908.					
January	817	200	676	1.61	1.86
February	893	450	766	1.82	1.96
March	822	42	553	1.32	1.52
April	733	150	523	1.25	1.40
May	825	58	560	1.33	1.53
June	825	150	637	1.52	1.70
July	817	67	563	1.34	1.54
August	817	300	679	1.62	1.87
September	817	342	719	1.71	1.91
October	817	267	698	1.66	1.91
November	768	333	661	1.57	1.75
December	695	350	587	1.40	1.61
The year	893	42	635	1.51	20.56

SACO RIVER DRAINAGE BASIN.

DESCRIPTION.

Saco River rises in the White Mountain region of New Hampshire at an elevation of about 1,900 feet above the sea and has a general southeasterly course to the Atlantic Ocean. It is about 105 miles long, the maximum width of its drainage basin is about 30 miles, and its drainage area, comprising 1,720 square miles, lies about equally in Maine and New Hampshire. Ossipee River, the largest tributary of the Saco, enters the main stream near Great Falls, N. H.

The headwaters of the Saco are in one of the highest and roughest mountain regions in the eastern portion of the United States, with steep wooded slopes and narrow river valleys, and with heavy falls to the mountain streams. The mountains grow gradually lower as the ocean is approached, becoming undulating hills in the central portions of the basin and comparatively flat land near the sea. The southern half of the drainage basin has been practically cleared of forests, but the remainder is still largely wooded. The prevailing rock is granite, which makes excellent building material for dams and foundations. The surface material covering the larger part of the region is sand and gravel.

The mean annual precipitation is about 43 inches. Winter conditions in the mountainous part of the basin are quite rigorous and snowfall usually deep.

The Saco River drainage basin has about 84 square miles of lake surface, of which Great Ossipee and Moose lakes are the most important. In its upper courses the river falls very rapidly, but the regimen of flow is variable and typical of the mountain stream. In the lower part of the basin, particularly below the entrance of Ossipee River, the stream is more stable in regimen. There are some excellent undeveloped power sites upon Saco River, and at Biddeford and Saco are the important developments of the Saco Water Power Company, furnishing power for cotton mills. The Saco is probably destined to much development in the next few years, as its power is adjacent to Portland and other cities where a good market is available.

Complete yearly records are not available, but the driest year since 1903 was 1906, and the wettest 1907, the total flow during these two years being about in the ratio of 1 to 1.45.

The following gaging stations have been maintained in this river basin:

Saco River near Center Conway, N. H. (1903–1908).
Saco River at West Buxton, Me. (1907–1908).

SACO RIVER NEAR CENTER CONWAY, N. H.

This station is located at the wooden highway bridge between Center Conway and Redstone, N. H., about 2 miles from each place. It was established August 26, 1903, in cooperation with the New Hampshire forestry commission, to obtain general statistical data regarding the flow of Saco River. Since 1904 it has been maintained by the United States Geological Survey.

It is about 3 miles below the mouth of Swift River and 2 miles above the outlet of Conway Lake. During the winter months the discharge is so affected by ice that the station is discontinued. Conditions for

obtaining accurate discharge data during the rest of the year are good, and a good rating curve has been developed except for extreme high stages.

The gage datum has remained the same during the maintenance of the station.

The following discharge measurement was made November 23, 1907: Width, 192 feet; area, 496 square feet; gage height, 4.94 feet; discharge, 865 second-feet.

Daily gage height, in feet, of Saco River near Center Conway, N. H., for 1907–8.

[Edward W. Davidson and Fred Masterton, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	.....	.....	6.65	11.3	5.0	5.9	3.65	3.3	5.7	6.0	.....
2	.....	.....	.....	6.05	8.95	5.0	4.9	3.8	3.35	5.15	5.7	.....
3	.....	.....	.....	5.65	8.0	5.3	4.5	4.05	3.45	4.9	[b]13.10	.....
4	.....	.....	.....	5.65	7.5	5.45	4.3	4.0	3.65	5.8	8.65	.....
5	.....	.....	.....	5.9	6.9	5.1	4.0	4.4	4.2	5.3	7.3	.....
6	.....	.....	.....	5.9	6.75	6.1	4.45	4.0	4.4	4.95	6.8	.....
7	.....	.....	.....	5.6	6.65	5.6	3.9	3.95	4.0	4.7	12.9	.....
8	.....	.....	.....	5.5	6.85	5.3	4.0	3.85	.....	4.85	8.35	.....
9	.....	.....	.....	5.3	7.4	5.05	3.95	3.7	.....	6.55	7.25	4.9
10	.....	.....	.....	5.1	7.2	4.95	3.85	3.65	.....	5.55	6.8	5.55
11	.....	.....	.....	5.15	7.05	4.85	3.9	3.6	6.75	5.2	6.5	7.45
12	.....	.....	.....	5.1	5.35	4.65	4.1	3.55	5.8	5.2	6.25	6.7
13	.....	.....	.....	5.15	6.2	4.55	4.35	3.5	5.1	5.35	5.9	6.25
14	.....	.....	.....	5.1	7.45	4.45	4.05	3.55	4.3	5.1	5.7	5.9
15	.....	.....	.....	5.15	7.6	4.5	3.95	3.5	3.85	4.85	5.5	5.8
16	.....	.....	.....	5.15	7.8	4.4	3.9	3.55	3.7	4.65	5.3	5.6
17	.....	.....	.....	5.3	8.1	4.3	3.8	3.5	3.65	4.6	5.2	5.3
18	.....	.....	.....	5.3	7.05	4.2	3.8	3.45	3.6	4.45	5.1	5.15
19	.....	.....	.....	5.3	6.8	4.1	3.65	3.4	3.55	4.35	5.05	5.0
20	.....	.....	.....	5.2	6.5	4.2	3.65	3.35	3.5	4.35	4.95	4.95
21	.....	.....	.....	5.1	6.0	4.15	3.65	3.4	3.45	4.3	4.95	5.05
22	.....	.....	.....	5.15	5.55	4.0	3.6	3.4	3.4	4.25	4.9	4.7
23	.....	.....	.....	5.85	5.35	3.95	3.65	3.35	3.35	4.2	4.95	5.0
24	.....	.....	.....	7.25	5.25	3.95	3.75	3.35	4.15	4.1	4.85	7.35
25	.....	.....	.....	7.7	5.1	3.9	3.7	3.4	4.3	4.05	4.9	6.05
26	.....	.....	.....	6.9	5.05	3.9	3.9	3.35	4.15	4.05	4.9	5.55
27	.....	.....	.....	8.6	5.05	4.15	4.15	3.3	4.0	4.0	4.75	5.25
28	.....	.....	.....	7.85	5.25	4.15	4.45	3.3	3.85	6.3	4.65	5.2
29	.....	.....	10.9	8.5	5.1	4.05	3.95	3.3	4.4	9.85	4.55	5.35
30	.....	.....	8.8	9.6	5.05	4.15	3.8	3.25	7.1	7.6	4.4	5.25
31	.....	.....	7.4	.....	5.15	.....	3.7	3.25	.....	6.6	.....	5.3
1908.[c]												
1	5.11	.....	.....	5.98	9.92	6.57	3.71	3.66	3.50	3.54	3.48	3.65
2	4.91	.....	.....	5.86	8.33	5.85	3.66	3.64	3.48	3.42	3.40	3.60
3	4.88	.....	.....	5.55	7.84	5.43	3.58	3.57	3.50	3.48	3.39	3.65
4	4.74	.....	.....	5.16	7.50	5.20	3.58	3.54	3.47	3.50	3.36	3.69
5	5.22	.....	.....	5.00	6.94	5.00	3.82	3.68	3.45	3.42	3.38	3.67
6	.....	.....	.....	5.23	6.72	4.85	3.71	7.25	3.42	3.39	3.35	.....
7	.....	.....	.....	5.70	6.44	4.72	3.62	6.47	3.41	3.36	3.35	.....
8	.....	.....	.....	6.20	6.89	4.66	3.68	5.18	3.41	3.37	3.37	.....
9	.....	.....	.....	5.72	7.12	4.54	3.56	4.68	3.40	3.34	3.38	.....
10	.....	.....	.....	5.52	6.75	4.41	3.50	4.38	3.38	3.30	3.36	.....
11	.....	.....	.....	5.98	6.44	4.33	3.49	4.20	3.36	3.40	3.40	.....
12	.....	.....	.....	6.15	6.70	4.25	3.48	5.23	3.34	3.65	3.54	.....
13	.....	.....	.....	5.82	7.15	4.21	3.42	4.45	3.32	3.54	3.62	.....
14	.....	.....	.....	5.56	6.41	4.12	3.41	4.19	3.31	3.42	3.56	.....
15	.....	.....	.....	5.70	5.98	4.04	3.40	4.02	3.30	3.38	3.50	.....

[a] River frozen over January 1 to March 29, and December 1 to 9 and 26 to 31, 1907.

[b] Maximum gage height November 3, 1907, at 2.30 p. m. was 17.14 feet.

[c] Ice conditions January 5 to March 22, 1908, except February 16 and 17, which were probably not materially affected by ice. Ice conditions also prevailed December 6 to 31, 1908.

Daily gage height, in feet, of Saco River near Center Conway, N. H., for 1907–8—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	.....	10.14	8.24	6.65	5.84	4.49	3.39	3.88	3.29	3.38	3.42	.....
17	.....	7.09	.....	5.94	5.83	4.74	3.39	3.90	3.30	3.36	3.41	.....
18	.....	8.27	.....	5.80	5.74	4.26	4.18	4.45	3.27	3.34	3.38	.....
19	.....	.....	6.59	5.95	5.69	4.12	4.07	4.14	3.28	3.32	3.43	.....
20	.....	.....	5.93	6.07	5.59	4.02	5.85	3.93	3.25	3.31	3.40	.....
21	.....	.....	5.48	5.62	5.37	3.98	4.78	3.74	3.25	3.30	3.40	.....
22	.....	.....	4.86	5.46	5.78	3.92	4.38	3.78	3.28	3.32	3.43	.....
23	.....	.....	4.72	5.56	6.88	3.86	4.30	3.74	3.26	3.30	3.38	.....
24	.....	.....	5.16	6.84	6.11	3.86	4.02	3.71	3.32	3.29	3.41	.....
25	.....	.....	5.44	7.17	5.64	3.85	3.92	3.69	3.34	3.31	3.48	.....
26	.....	.....	4.96	8.56	5.32	3.82	4.18	3.64	3.32	3.30	3.68	.....
27	.....	.....	5.93	8.84	5.24	3.73	4.03	3.62	3.28	3.44	4.06	.....
28	.....	.....	6.94	10.01	5.10	3.70	3.82	3.60	3.27	3.58	4.06	.....
29	.....	.....	7.32	8.72	4.99	3.70	3.75	3.57	3.45	3.55	3.80	.....
30	.....	.....	6.84	7.68	4.88	3.68	3.69	3.54	3.89	3.65	3.65	.....
31	.....	.....	6.20	.....	8.04	.....	3.69	3.61	.....	3.58	.....	.....

Rating table for Saco River near Center Conway, N. H., for 1906–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.00	100	4.30	557	5.60	1,428	7.80	3,835
3.10	115	4.40	612	5.70	1,509	8.00	4,120
3.20	133	4.50	669	5.80	1,592	8.20	4,425
3.30	154	4.60	728	5.90	1,677	8.40	4,740
3.40	178	4.70	789	6.00	1,764	8.60	5,060
3.50	206	4.80	852	6.20	1,950	8.80	5,395
3.60	238	4.90	917	6.40	2,150	9.00	5,735
3.70	274	5.00	984	6.60	2,355	10.00	7,600
3.80	314	5.10	1,053	6.80	2,570	11.00	9,600
3.90	358	5.20	1,124	7.00	2,795	12.00	11,700
4.00	404	5.30	1,197	7.20	3,030	13.00	13,900
4.10	453	5.40	1,272	7.40	3,285	14.00	16,200
4.20	504	5.50	1,349	7.60	3,555		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made during 1903–1907 and is well defined between gage heights 3.3 feet and 9 feet.

Monthly discharge of Saco River near Center Conway, N. H., for 1907–8.

[Drainage area, 385 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	.....	340	0.883	1.02	D.
February	.....	.....	160	.416	.43	D.
March	.....	.....	800	2.08	2.40	D.
April	6,830	1,050	2,020	5.25	5.86	A.
May	10,200	1,020	2,630	6.83	7.87	A
June	1,860	358	750	1.95	2.18	B.
July	1,680	238	446	1.16	1.34	B.
August	612	144	242	.629	.73	C.
September	2,910	154	555	1.44	1.61	B.
October	7,300	404	1,290	3.35	3.86	A.
November	14,100	612	2,490	6.47	7.22	A.
December	3,350	.....	1,160	3.01	3.47	B.
The year	14,100	.....	1,070	2.79	37.99	
1908.						
January	1,060	.....	523	1.36	1.57	D.
February	7,880	.....	775	2.01	2.17	D.
March	3,180	.....	882	2.29	2.64	C.
April	7,620	984	2,290	5.95	6.64	A
May	7,440	904	2,330	6.05	6.98	A.
June	2,320	267	657	1.71	1.91	B.
July	1,630	176	363	.943	1.09	B.
August	3,090	219	557	1.45	1.67	B.
September	354	144	174	.452	.50	C.
October	256	152	184	.478	.55	C.
November	433	166	211	.548	.61	C.
December	270	.....	167	.434	.50	D.
The year	7,880	.....	759	1.97	26.83	

NOTE.—Discharge during the frozen periods 1907 and 1908 also September 8 to 10, 1907, based on the discharge for the corresponding periods of Pemigewasset River at Plymouth.

	Second-feet.
Discharge March 1–28, 1907	326
March 29, 1907	7,000
September 8–10, 1907	267
December 1–9, 1907	450
December 26–31, 1907	1,000
January 5, 1908	800
January 6–31, 1908	450
February 1–15, 1908	260
February 18–29, 1908	650
March 1–22, 1908	500
December 6–31, 1908	150

SACO RIVER AT WEST BUXTON, ME.

During October, 1907, a hydro-electric plant was completed at West Buxton, Me., by the Portland Electric Company. Records of flow at this point have been kept since that time, under the direction of J. G. White & Co., engineers and builders of the plant, and furnished the United States Geological Survey through their courtesy.

The dam is of concrete, with a rollway about 300 feet long, and a head of about 25 feet is utilized by three 750-kilowatt units. The discharge is based upon gage readings taken every hour and the results are considered excellent.

Daily discharge, in second-feet, of Saco River at West Buxton, Me., for 1907–8.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1907.				1907.				1907.			
1	.....	5,132	a 2,619	11	.....	12,761	4,079	21	1,857	4,149	4,506
2	.....	5,398	2,595	12	.....	10,898	5,930	22	1,705	4,149	a 3,527
3	.....	a 6,720	2,397	13	.....	9,541	5,636	23	1,749	3,889	3,937
4	.....	7,859	2,397	14	.....	8,581	5,930	24	1,699	a 3,431	4,709
5	.....	8,232	2,397	15	.....	7,483	a 5,506	25	1,606	3,781	4,679
6	.....	10,469	2,202	16	.....	6,661	6,226	26	1,155	3,639	5,012
7	.....	13,223	2,017	17	.....	a 5,710	6,226	27	a 1,105	3,889	5,060
8	.....	13,018	a 1,425	18	.....	5,434	5,636	28	1,613	3,531	4,994
9	.....	13,472	2,397	19	2,079	3,546	5,348	29	2,607	3,889	a 4,490
10	.....	a13,347	2,595	20	a 1,771	4,270	4,782	30	4,006	3,163	4,990
								31	4,863	.....	5,335

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	5,000	1,791	a2,395	7,771	11,404	6,341	1,244	683	816	757	a 588	797
2	4,580	a1,522	2,736	7,790	11,641	5,631	1,800	a 878	771	782	884	777
3	3,940	1,972	2,532	7,551	a12,197	5,443	1,719	1,049	752	899	775	744
4	3,445	1,989	2,621	7,162	13,263	5,409	666	1,311	747	a 759	657	727
5	a3,635	2,008	2,604	a6,427	12,577	5,111	a 609	1,119	747	773	634	556
6	2,555	1,944	2,541	6,388	11,903	4,768	1,741	1,261	a 255	897	668	a 333
7	2,990	2,456	2,459	6,404	10,636	a4,343	1,256	1,337	735	836	722	470
8	4,540	2,219	a2,212	6,503	9,821	4,039	1,751	1,938	751	732	a 509	735
9	4,740	a1,880	2,423	6,527	9,574	3,823	1,289	a1,967	505	711	645	746
10	4,260	1,772	2,219	6,693	a9,093	3,291	1,113	2,153	423	696	624	793
11	3,635	1,973	2,129	6,997	8,688	2,982	1,058	2,499	419	a 562	641	740
12	a3,215	2,018	2,129	a7,299	8,003	2,901	a 709	2,276	632	766	578	744
13	3,765	2,118	2,286	7,192	7,892	2,627	756	1,709	a 293	a 838	635	a 452
14	3,778	2,243	2,115	6,714	7,111	a2,303	1,176	1,586	924	693	622	840
15	3,442	2,520	a2,213	6,641	7,167	2,249	1,134	1,398	691	664	a 410	798
16	3,220	a4,864	3,392	6,714	6,831	2,063	841	a 965	1,053	662	629	755
17	2,818	5,586	4,123	6,401	a6,366	1,860	832	1,191	811	622	712	715
18	2,765	4,594	3,968	6,241	6,098	2,067	1,380	1,250	988	a 517	615	732
19	a2,525	4,243	3,526	a6,489	5,778	2,039	a 455	869	890	624	623	676
20	2,823	3,875	3,249	6,485	5,493	1,939	938	1,121	a 546	638	649	a 464
21	2,858	3,795	3,196	6,365	4,758	a1,571	1,217	1,074	818	679	619	789
22	2,803	3,745	a3,004	6,162	4,536	1,596	1,471	1,025	780	644	a 405	737
23	2,555	a3,280	3,383	5,938	4,773	1,791	1,406	a 877	723	582	579	739
24	2,236	3,294	5,031	5,886	a4,580	1,698	1,555	899	763	552	617	850
25	2,244	3,134	6,529	5,714	5,074	1,538	1,242	938	732	a 431	684	492
26	a1,818	2,966	5,478	a5,921	5,209	1,418	a 849	727	664	583	514	658
27	2,435	2,878	4,219	6,562	5,164	1,296	1,042	669	a 589	679	742	a 462
28	2,364	2,811	6,535	6,953	4,830	a 662	1,180	797	842	743	772	662
29	2,153	2,781	a6,501	8,434	4,636	1,175	909	842	914	726	a 552	671
30	2,111	.....	7,430	9,641	4,369	1,561	778	a 742	761	787	862	592
31	1,801	.....	7,532	.....	a5,777	.....	1,068	787	.....	783	.....	569

a Sundays.

Monthly discharge of Saco River at West Buxton, Me., for 1907–8.

[Drainage area, 1,550 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
October 19–31	4,860	1,100	2,140	1.38	0.67
November	13,500	3,160	6,980	4.50	5.02
December	6,230	1,425	4,260	2.75	3.17
1908.					
January	5,000	1,800	3,130	2.02	2.33
February	5,590	1,520	2,840	1.83	1.97
March	7,530	2,120	3,640	2.35	2.71
April	9,640	5,710	6,800	4.39	4.90
May	13,300	4,370	7,590	4.90	5.65
June	6,340	662	2,850	1.84	2.05
July	1,800	455	1,140	.735	.85
August	2,500	669	1,220	.787	.91
September	1,050	255	711	.459	.51
October	899	431	697	.450	.52
November	884	405	639	.412	.46
December	850	333	671	.433	.50
The year	13,300	255	2,660	1.72	23.30

MERRIMAC RIVER DRAINAGE BASIN.

DESCRIPTION.

Merrimac River is formed near Franklin, N. H., by the union of Pemigewasset and Winnepesaukee rivers. The Winnepesaukee is a short stream coming from the northeast and forming the outlet of Lake Winnepesaukee, while the Pemigewasset has its extreme sources between 50 and 60 miles to the north of Franklin, and less than 10 miles from Mount Washington. From Franklin the course of the river is southward for about 60 miles, where it crosses the state line into Massachusetts. A few miles below the state line, as it approaches the city of Lowell, it turns abruptly and runs for some 40 miles northeastward to the ocean at Newburyport. Its total length is about 110 miles, and its drainage area measures 5,015 square miles, about 1,200 square miles being in Massachusetts, of which 212 square miles lie in the Nashua, Sudbury, and Lake Cochituate drainages, from which water is permanently diverted for the supply of the metropolitan district adjacent to Boston.

Important tributaries of the Merrimac other than the headwater streams are the Contoocook, Suncook, Piscataquog, Souhegan, and Nashua. The Nashua River lies nearly all in Massachusetts, but enters the Merrimac near Nashua, N. H. The other tributaries mentioned are all in New Hampshire.

The headwaters of the Pemigewasset reach an elevation approximately 2,000 feet above the sea, while at Franklin the river is at an elevation of about 270 feet. The upper portion of the basin is rough

and mountainous and very largely in forest. Below Franklin the country is more uniform in topography and largely in farm land. The main river consists of a series of reaches with moderate slopes, usually separated by falls over ledge rock, and the fall being thus concentrated at a few places makes the river valuable for power purposes.

The observed mean annual rainfall is about 42 inches, varying from about 46 inches at Lowell to about 38 inches at Plymouth. It is probable, however, that in the mountain regions near the source of the Pemigewasset the precipitation is much greater than elsewhere in the drainage basin. The river is generally frozen during the winter, and especially in its northern portions there is usually a deep fall of snow.

The Merrimac drainage basin is well supplied with natural facilities for storage, the combined area of lakes and ponds amounting to approximately 183 square miles. About 105 square miles of this is tributary to the Winnepesaukee River, and of this amount about 72 square miles is composed of Lake Winnepesaukee—next to Moosehead Lake the largest body of water in New England—which has about 4 feet of available depth of storage, corresponding to somewhat less than 8 billion cubic feet. Squam Lake, tributary to the Pemigewasset through Squam River at Ashland, is also a large lake, with nearly 15 square miles area. Newfound Lake is also tributary to the Pemigewasset, with about half the water area of Squam Lake. The storage on all of these lakes, besides numerous smaller ones, is controlled by users of water power on the river and serves to improve the regimen of low water flow very greatly. In a general way the most favorable opportunities for storage on the Merrimac are being utilized, but there are still many reservoir sites, especially in the upper portions of the drainage basin, that will also be of eventual service for this purpose.

The river is navigable as far as Haverhill, and for small boats as far as Lawrence.

The Merrimac is one of the most noted rivers in the country, and in fact in the world, for the development of water power. Lawrence, Lowell, and Manchester are great industrial centers, largely devoted to cotton and woolen manufactures, that owe their location to the excellent water power available at their sites. There are only one or two opportunities remaining for power development on the main river, but on the tributaries, especially the Pemigewasset and its tributaries, there is a large amount of unutilized fall. (See Plate IV.) The longest available run-off record of flow on the Merrimac is that at Lawrence, extending back to 1890, and the driest year was 1893, and the wettest 1890, the total flow during these two years being about in the ratio of 1 to 1.93.

The following gaging stations have been maintained in this river basin:

Pemigewasset River at Plymouth, N. H. (1886–1908).
Merrimac River at Franklin Junction, N. H. (1903–1908).
Merrimac River at Garvins Falls, N. H. (1904–1908).
Merrimac River at Lawrence, Mass. (1890–1908).
Contoocook River at West Hopkinton, N. H. (1903–1907).
Suncook River at East Pembroke, N. H. (1904–5).
South Branch Nashua River at Clinton, N. H. (1896–1908).
Sudbury River at Framingham, Mass. (1875–1908).
Lake Cochituate at Cochituate, N. H. (1863–1908.)

PEMIGEWASSET RIVER AT PLYMOUTH, N. H.

This station is located at the wooden highway bridge a short distance below the mouth of Bakers River in the town of Plymouth, and was established September 5, 1903, in cooperation with the New Hampshire Forestry Commission, to procure general information regarding the flow of this river. From 1904 to June 30, 1907, it was maintained by the United States Geological Survey, and since the latter date gage heights have been furnished by the Locks and Canals Company, of Lowell, Mass.

The nearest dam upstream is at the pulp mills at Livermore Falls, distant some 3 miles. Downstream the nearest dam is at Franklin, 25 miles away.

The gage datum has remained the same during the maintenance of the station. During the winter months the discharge is usually affected by ice. Conditions for obtaining accurate discharge data are good, and a good rating curve has been developed.

Prior to 1903 a record of gage heights at Plymouth was obtained by the Locks and Canals Company extending back to 1886, and estimates of discharge of the river have been made covering this period and published in Water-Supply Paper 124, pages 97–101.

The following discharge measurement was made October 10, 1908: Width, 103 feet; area, 176 square feet; gage height, 1.51 feet; discharge, 229 second-feet.

Daily gage height, in feet, of Pemigewasset River at Plymouth, N. H., for 1907–8.

[Frank Morton, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	2.7	2.5	2.9	6.65	11.15	3.0	4.25	2.0	([b])	4.45	4.6	([b])
2	3.9	.....	.....	4.8	7.95	2.9	3.75	1.85	.....	3.6	4.2	2.35
3	3.7	.....	.....	4.1	6.5	3.1	3.25	2.45	.....	3.25	12.85	2.35
4	3.35	.....	.....	4.05	5.85	3.3	2.75	([b])	1.35	3.2	10.1	2.25
5	3.1	.....	.....	4.85	5.5	3.4	2.7	2.35	1.6	4.5	5.95	2.2
6	4.2	.....	.....	4.7	5.05	4.95	2.35	2.2	3.6	([b])	5.0	2.2
7	4.0	.....	.....	4.1	5.0	4.2	([b])	1.85	2.35	3.1	10.25	2.1
8	3.5	2.8	2.4	4.1	5.2	3.7	2.2	1.95	([b])	3.35	7.7	([b])
9	3.3	.....	.....	3.7	5.7	3.45	2.2	1.5	1.75	7.25	5.6	2.0
10	3.25	.....	.....	3.55	5.4	3.2	2.1	1.7	1.7	4.6	([b])	2.2

[a] River frozen January 1 to March 24, 1907. River probably not affected by ice conditions during December, 1907. Gage readings during the frozen period are to water surface in a hole in the ice.
[b] Sunday.

PROFILE FALLS NEAR THE MOUTH OF SMITHS RIVER, BRISTOL, N. H.

Daily gage height, in feet, of Pemigewasset River at Plymouth, N. H., for 1907-8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
11	2.85	.....	.....	3.55	5.15	3.1	1.95	(a)	1.6	3.85	4.5	13.6
12	.....	.....	.....	3.4	4.6	2.9	2.0	1.6	4.35	3.95	3.95	7.1
13	.....	.....	.....	3.55	4.4	2.8	2.6	1.6	2.85	(a)	3.5	4.25
14	.....	.....	.....	3.6	5.3	2.6	(a)	1.7	2.35	3.7	3.35	4.1
15	.....	2.6	2.9	3.65	5.7	2.5	2.1	1.5	(a)	3.25	3.2	(a)
16	.....	.....	.....	3.45	5.7	2.45	1.95	1.45	2.1	2.95	2.95	3.6
17	2.2	.....	.....	3.45	7.6	2.3	1.95	1.45	2.0	2.85	(a)	3.45
18	.....	.....	.....	3.5	5.95	2.3	1.85	(a)	1.95	2.75	2.85	3.25
19	.....	.....	.....	3.5	5.25	2.2	1.7	1.35	1.85	2.6	2.85	3.1
20	.....	.....	.....	3.3	5.0	2.2	1.7	1.45	1.85	(a)	2.75	2.95
21	.....	.....	.....	3.4	4.2	2.8	(a)	1.35	1.75	2.45	2.7	2.85
22	.....	2.1	.....	3.5	3.8	2.5	1.75	1.35	(a)	2.25	2.7	(a)
23	.....	.....	[b] 3.4	4.55	3.5	2.3	1.7	1.35	1.7	2.2	2.5	2.7
24	2.7	.....	.....	8.35	3.3	2.05	1.95	1.25	2.75	2.1	(a)	6.6
25	.....	.....	4.3	7.6	3.15	2.1	1.85	(a)	3.1	2.2	2.75	4.75
26	.....	.....	4.2	6.2	3.0	2.15	1.85	1.25	2.35	2.1	2.75	3.1
27	.....	.....	4.05	8.8	3.2	2.9	2.95	1.25	2.25	(a)	2.7	3.25
28	.....	.....	4.7	6.4	3.5	2.85	(a)	1.35	2.1	4.7	2.5	3.2
29	.....	.....	6.6	8.3	3.4	2.5	2.1	1.25	(a)	12.25	2.45	(a)
30	.....	.....	9.4	9.0	3.2	2.6	1.95	1.25	7.6	9.35	2.25	3.1
31	.....	.....	7.8	.....	3.0	.....	2.1	.....	.....	5.7	.....	3.45
1908.[c]												
1	3.25	2.85	(a)	4.35	8.2	4.6	1.5	1.6	1.45	1.5	(a)	1.95
2	3.2	(a)	2.45	4.1	7.85	3.85	1.5	(a)	1.45	1.35	1.6	1.75
3	3.0	2.7	2.5	3.6	(a)	3.5	1.5	1.5	1.35	2.0	1.5	1.7
4	2.95	2.6	2.6	3.25	7.45	3.2	1.45	1.5	1.35	(a)	1.7	1.6
5	(a)	2.95	2.5	(a)	6.6	2.85	(a)	2.0	1.45	1.7	1.75	1.6
6	3.45	2.95	2.45	3.2	5.5	2.6	1.85	7.45	(a)	1.45	1.7	(a)
7	3.7	2.85	2.35	3.85	5.0	(a)	1.75	4.1	1.45	1.6	1.6	1.7
8	3.75	2.85	(a)	4.75	5.25	2.35	1.75	3.2	1.35	1.5	(a)	2.1
9	4.7	(a)	2.2	4.1	5.85	2.2	1.6	(a)	1.2	1.35	1.5	2.0
10	4.1	2.6	2.2	3.6	(a)	2.1	1.5	2.45	1.2	(d)	1.5	1.95
11	3.6	2.5	2.1	4.2	5.1	2.1	1.45	2.2	(d)	(a)	1.35	1.85
12	(a)	2.5	2.25	(a)	5.1	2.2	(a)	3.7	1.25	1.35	1.45	1.85
13	3.95	2.45	2.25	4.25	6.0	2.0	1.5	2.95	(a)	1.45	1.95	(a)
14	3.7	2.25	2.35	3.7	5.2	(a)	1.45	2.5	(d)	1.25	1.7	1.6
15	3.5	2.1	(a)	3.75	4.95	1.95	1.35	2.25	1.45	1.25	(a)	2.0
16	3.2	13.45	3.7	5.95	10.5	2.2	1.35	(a)	(d)	1.2	1.75	2.1
17	3.1	5.6	4.45	9.45	(a)	3.25	1.25	2.1	1.25	1.2	1.85	1.95
18	2.95	4.25	3.5	3.95	4.1	2.95	(d)	3.75	1.35	(a)	1.75	1.95
19	(a)	3.75	3.2	(a)	4.2	2.5	(a)	3.45	1.35	(d)	1.5	1.85
20	2.85	3.2	2.7	4.7	3.95	2.1	4.95	3.0	(a)	1.25	1.6	(a)
21	2.7	3.25	2.45	3.85	3.45	(a)	3.6	2.6	1.2	1.25	1.6	1.95
22	2.75	3.1	(a)	3.7	3.85	2.0	2.85	2.45	(d)	1.25	(a)	1.75
23	2.6	(a)	3.45	3.5	4.85	1.85	3.0	(a)	1.35	1.5	1.5	1.75
24	2.5	2.75	3.75	6.25	(a)	1.85	2.85	1.95	1.25	1.35	1.5	1.85
25	2.5	2.7	5.1	7.1	3.7	1.75	2.25	1.75	(d)	(a)	1.45	2.1
26	(a)	2.5	4.1	(a)	3.35	1.75	(a)	1.6	1.25	1.25	1.95	2.1
27	2.45	2.6	4.2	9.5	3.1	1.7	2.1	1.7	(a)	1.25	2.6	(a)
28	3.5	2.7	5.85	11.0	2.95	(a)	1.95	1.6	(d)	(d)	2.5	2.0
29	3.35	2.6	(a)	11.0	3.0	1.7	1.85	1.7	1.25	1.5	(a)	2.0
30	3.45	.....	5.95	7.45	2.85	1.6	1.75	(a)	1.95	1.85	2.0	1.95
31	3.1	.....	4.7	.....	(a)	.....	1.6	1.5	.....	1.75	.....	1.95

[a] Sunday.
[b] Top of ice.
[c] Ice conditions from about January 5 to February 15, and about December 15 to 31, 1908. January 9 and 10 assumed open.
[d] Gage height less than 1.2 feet.

Rating table for Pemigewasset River at Plymouth, N. H., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.10	108	2.70	945	4.30	2,445	6.80	5,850
1.20	135	2.80	1,025	4.40	2,5[illegible]	7.00	6,185
1.30	165	2.90	1,105	4.50	2,605	7.20	6,525
1.40	198	3.00	1,190	4.60	2,780	7.40	6,875
1.50	234	3.10	1,275	4.70	2,895	7.60	7,230
1.60	273	3.20	1,365	4.80	3,010	7.80	7,595
1.70	316	3.30	1,455	4.90	3,130	8.00	7,970
1.80	363	3.40	1,545	5.00	3,250	9.00	9,970
1.90	413	3.50	1,640	5.20	3,500	10.00	12,050
2.00	467	3.60	1,735	5.40	3,760	11.00	14,150
2.10	525	3.70	1,830	5.60	4,030	12.00	16,250
2.20	585	3.80	1,930	5.80	4,305	13.00	18,350
2.30	650	3.90	2,030	6.00	4,590	14.00	20,450
2.40	720	4.00	2,130	6.20	4,890		
2.50	790	4.10	2,235	6.40	5,200		
2.60	865	4.20	2,340	6.60	5,520		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made during 1905–1908, and is well defined.

Monthly discharge of Pemigewasset River at Plymouth, N. H., for 1907–8.

[Drainage area, 615 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.[a]						
January	.....	.....	525	0.854	0.98	C.
February	.....	.....	250	.407	.42	D.
March	10,800	.....	1,400	2.28	2.63	B.
April	9,970	1,460	3,450	5.61	6.26	A.
May	14,500	1,190	3,560	5.79	6.68	A.
June	3,190	496	1,100	1.79	2.00	A.
July	2,390	316	680	1.11	1.28	A.
August	755	150	296	.481	.55	A.
September	7,260	163	874	1.42	1.58	A.
October	16,800	500	2,480	4.03	4.65	A.
November	18,000	618	3,130	5.09	5.68	A.
December	19,600	467	2,110	3.43	3.95	A.
The year	19,600	.....	1,650	2.69	36.66	
1908.[b]						
January	2,900	.....	876	1.42	1.64	C.
February	19,300	.....	1,520	2.47	2.66	B.
March	5,000	525	1,600	2.60	3.00	A.
April	14,200	1,200	4,180	6.80	7.59	A.
May	13,100	1,060	3,980	6.47	7.46	A.
June	2,780	273	761	1.24	1.38	A.
July	3,190	120	555	.902	1.04	A.
August	6,960	234	944	1.53	1.76	A.
September	440	120	170	.276	.31	B.
October	467	120	206	.335	.39	B.
November	865	182	341	.554	.62	A.
December	525	.....	273	.444	.51	C.
The year	19,300	.....	1,280	2.09	28.36	

[a] Discharge during the frozen period 1907 estimated on the basis of the discharge at Franklin Junction and climatological reports. Discharge March 1 to 24, 1907, 400 second-feet. Discharge July 7, September 29, and October 27, 1907, estimated on the basis of Saco River at Center Conway. All other missing days interpolated.

[b] Discharge during the frozen periods, 1908, estimated on the basis of the discharge at Franklin Junction and climatological reports.

	Second-feet.
Discharge January 5 to 8, 1908	950
January 11 to 31, 1908	624
February 1 to 15, 1908	400
December 15 to 31, 1908	200

Discharge interpolated for missing days except March 29, April 5 and 12, May 31, July 18 and 19, September 11, 13, 14, 16, 22, 25, 27, 28, October 10, 11, 18, 19, 28, on which days the discharge was estimated on the basis of Saco River at Center Conway.

MERRIMAC RIVER AT FRANKLIN JUNCTION, N. H.

This station is located at the wooden railroad bridge near Franklin Junction, about 1 mile below the union of Pemigewasset and Winnipesaukee rivers, and was established July 8, 1903, to obtain general statistical and comparative data regarding the flow of the Merrimac.

Since June 30, 1907, gage heights at this point have been furnished by the Locks and Canals Company, of Lowell, Mass.

The records at this station, in conjunction with those at Garvins Falls and Lawrence, furnish fairly complete information regarding the total flow of the main river, and are of value for purposes of water power and studies of storage problems; also in regard to navigation in the portion of the river in tide water below Lawrence.

There are dams on both Pemigewasset and Winnipesaukee rivers within 2 miles of the station. The nearest dam downstream is at Sewall Falls, near Concord, distant some 15 miles.

The datum of the gage has remained the same since the establishment of the station. During the winter months the discharge is slightly affected for short periods by ice. Conditions for obtaining accurate discharge data are good, and a good rating curve has been developed for this station.

The following discharge measurement was made October 9, 1908: Width, 224 feet; area, 734 square feet; gage height, 4.12 feet; discharge, 1,100 second-feet.

Daily gage height, in feet, of Merrimac River at Franklin Junction, N. H., for 1907–8.

[F. R. Roers, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	4.7	5.2	.....	9.1	11.9	5.1	.....	4.45	.....	6.4	7.25	4.0
2	4.9	5.2	.....	7.8	10.3	4.75	.....	4.45	.....	6.0	6.4	4.35
3	5.1	.....	.....	6.7	8.6	5.4	.....	4.4	3.85	5.45	12.3	4.4
4	5.1	5.05	.....	6.5	8.0	5.4	.....	.....	3.9	5.3	12.55	4.4
5	5.15	5.05	.....	6.65	7.3	5.5	.....	4.6	4.1	5.3	8.55	4.35
6	4.85	5.15	.....	6.55	7.0	6.4	.....	4.5	4.2	.....	7.1	4.3
7	5.2	5.15	4.2	6.55	6.75	6.55	.....	4.45	4.3	5.55	11.3	4.2
8	5.0	5.2	4.2	6.5	6.55	6.0	.....	4.4	.....	6.3	8.7	4.1
9	4.8	5.15	4.15	6.25	6.55	.....	.....	4.3	4.2	7.85	7.3	4.4
10	4.7	.....	3.9	6.05	6.8	5.7	.....	4.3	4.25	7.4	10.15	4.9
11	4.6	.....	3.85	6.1	6.75	5.55	.....	.....	4.3	6.2	8.9	13.05
12	4.5	.....	3.85	6.2	6.4	5.4	.....	4.2	4.5	5.8	7.3	10.1
13	4.6	.....	3.95	6.0	6.15	5.3	.....	4.2	5.2	.....	6.55	8.5
14	4.7	.....	4.05	.....	5.9	5.2	.....	4.1	5.1	5.7	5.8	6.1
15	4.8	.....	4.2	6.1	6.95	5.2	.....	4.1	4.9	5.5	5.75	6.05
16	4.8	.....	4.4	6.15	6.75	.....	.....	4.05	4.6	5.5	5.7	5.9
17	4.85	.....	.....	6.1	8.6	4.9	.....	3.95	4.4	5.5	5.4	5.6
18	4.8	.....	4.8	6.0	8.75	4.8	.....	.....	4.3	5.6	5.3	5.1
19	4.7	.....	4.9	6.1	6.35	4.7	.....	4.0	4.2	5.5	5.2	5.1
20	.....	.....	4.8	5.9	6.9	4.6	4.2	3.9	4.2	.....	5.2	5.0

[a] Ice conditions prevailed from about January 17 to March 9, 1907. Station temporarily discontinued July 1 to 19, 1907.

Daily gage height, in feet, of Merrimac River at Franklin Junction, N. H., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	4.8	.....	4.7	5.3	6.7	4.55	.....	3.95	4.1	5.7	5.2	5.0
22	5.0	.....	4.95	5.6	6.15	4.55	4.3	3.95	.....	4.9	5.1	4.75
23	4.95	.....	5.5	6.3	5.8	.....	4.3	3.85	4.1	4.8	5.1	4.95
24	5.05	.....	5.5	8.1	5.6	4.5	4.3	.....	4.5	4.7	5.05	6.7
25	5.2	.....	5.65	10.35	5.4	4.55	4.35	.....	5.0	4.7	5.05	6.8
26	5.1	.....	5.6	8.15	5.0	4.55	4.4	4.1	4.9	4.6	5.2	5.75
27	5.2	.....	5.8	9.9	5.4	4.85	4.35	4.15	4.7	.....	5.0	5.2
28	5.1	.....	6.05	.....	5.5	5.1	.....	4.1	.....	5.0	4.7	5.1
29	5.2	.....	.....	8.4	5.6	4.9	4.4	4.0	.....	12.6	4.55	5.1
30	5.2	.....	7.6	9.9	5.4	4.5	.....	3.95	7.9	11.5	4.5	5.0
31	5.1	.....	12.15	.....	5.2	.....	4.3	3.9	.....	8.05	.....	5.0
1908.[a]												
1	4.88	6.12	5.38	6.62	9.35	6.45	4.32	4.50	4.38	3.80	.....	4.15
2	4.72	.....	5.10	6.38	8.65	6.35	4.22	.....	4.30	3.82	4.02	4.05
3	4.70	6.40	5.05	.....	9.00	6.15	4.20	4.48	4.32	3.92	4.10	4.05
4	4.70	.....	5.10	5.78	10.25	5.95	.....	4.50	4.25	.....	4.02	4.02
5	4.60	.....	4.92	.....	9.85	5.78	.....	4.52	4.18	3.95	4.05	3.98
6	4.68	.....	4.82	5.88	8.85	5.50	4.12	6.25	4.10	4.02	4.08	.....
7	4.60	.....	4.72	5.92	8.30	.....	4.20	6.90	4.12	4.05	4.00	3.92
8	5.15	.....	.....	6.00	8.70	5.38	4.30	.....	4.05	4.00	.....	4.02
9	5.82	.....	4.62	6.12	8.65	5.18	4.28	.....	4.15	4.08	4.10	4.15
10	5.58	.....	4.58	6.22	.....	4.95	4.22	.....	4.00	4.00	4.18	4.12
11	5.08	.....	4.70	6.50	8.35	4.88	4.20	5.65	4.08	.....	4.10	4.12
12	4.85	.....	4.68	.....	7.40	4.80	.....	5.52	4.10	3.98	4.15	4.08
13	4.72	.....	4.60	6.78	7.50	4.78	4.12	5.35	.....	4.02	4.18	.....
14	4.62	.....	4.60	6.48	7.40	.....	4.02	5.15	3.90	4.02	4.20	4.02
15	4.50	.....	.....	6.08	7.15	4.70	4.00	4.85	4.02	4.00	.....	4.08
16	.....	9.90	6.50	6.78	6.90	4.62	4.02	.....	4.10	3.98	4.22	4.00
17	.....	9.25	6.52	6.78	.....	4.65	4.10	4.52	4.02	3.95	4.20	3.92
18	.....	6.30	6.48	6.48	6.45	4.62	4.12	4.40	4.00	.....	4.08	3.95
19	.....	6.02	6.32	.....	6.20	4.58	.....	4.52	3.95	3.92	4.05	3.98
20	.....	5.68	6.10	6.25	6.15	4.50	.....	4.50	.....	3.92	4.00	.....
21	.....	5.82	6.05	6.08	6.25	.....	5.15	4.42	3.90	3.95	4.02	4.10
22	4.52	.....	5.85	6.40	6.30	4.50	5.25	4.50	3.82	3.90	.....	4.02
23	4.55	.....	6.00	.....	.....	4.48	5.05	.....	3.80	3.88	4.08	3.98
24	4.60	5.68	6.60	7.05	.....	4.42	4.92	4.48	3.85	3.92	4.10	3.92
25	4.65	5.60	6.85	8.05	6.10	4.38	4.72	4.40	3.82	.....	4.10	.....
26	4.75	5.48	6.95	.....	5.98	4.32	.....	4.48	3.78	3.85	.....	3.92
27	5.28	5.35	7.10	10.2	6.00	4.25	4.70	4.42	.....	3.90	4.22	.....
28	5.15	5.08	7.35	10.5	5.85	.....	4.62	4.38	3.90	3.95	4.28	3.88
29	5.08	4.95	.....	12.25	5.92	4.35	4.52	.....	3.82	4.05	.....	3.85
30	5.25	.....	8.00	9.40	.....	4.35	4.52	.....	3.80	4.12	4.20	.....
31	5.80	.....	7.22	.....	.....	.....	4.50	4.30	.....	4.05	.....	.....

[a] Ice conditions about January 30 to February 15 and December 30 to 31, 1908.

Rating table for Merrimac River at Franklin Junction, N. H., for 1906–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.70	660	4.80	1,940	5.90	3,660	8.00	7,600
3.80	750	4.90	2,080	6.00	3,830	8.20	8,000
3.90	850	5.00	2,230	6.20	4,180	8.40	8,400
4.00	950	5.10	2,380	6.40	4,540	8.60	8,800
4.10	1,060	5.20	2,530	6.60	4,900	8.80	9,200
4.20	1,170	5.30	2,680	6.80	5,270	9.00	9,600
4.30	1,290	5.40	2,840	7.00	5,650	10.00	11,700
4.40	1,410	5.50	3,000	7.20	6,030	11.00	13,800
4.50	1,540	5.60	3,160	7.40	6,410	12.00	15,900
4.60	1,670	5.70	3,320	7.60	6,800	13.00	18,000
4.70	1,800	5.80	3,490	7.80	7,200	14.00	20,100

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1905–1908, and is well defined between gage heights 4 feet and 16 feet. Above gage height 9 feet the rating curve is a tangent, the difference being 210 per tenth. The curve for high stages has been drawn about 5 to 10 per cent greater than 3 high-water measurements of 1906, all of which were made on a rapidly falling stage. It is considered as closely representing the flow for stationary stages.

Monthly discharge of Merrimac River at Franklin Junction, N. H., for 1907–8.

[Drainage area, 1,460 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,530	.....	1,820	1.25	1.44	B.
February	.....	.....	1,350	.925	.96	C.
March	16,200	800	2,460	1.68	1.94	A.
April	12,400	2,680	5,780	3.96	4.42	A.
May	15,700	2,230	5,410	3.71	4.28	A.
June	4,810	1,540	2,470	1.69	1.89	A.
July	3,500	1,170	1,640	1.12	1.29	B.
August	1,670	800	1,130	.774	.89	B.
September	7,400	800	1,720	1.18	1.32	A.
October	17,200	1,600	4,180	2.86	3.30	A.
November	17,100	1,540	5,440	3.73	4.16	A.
December	18,100	950	3,410	2.34	2.70	A.
The year	18,100	800	3,070	2.10	28.59	
1908.						
January	3,520	.....	1,980	1.36	1.57	A.
February	11,500	.....	2,930	2.01	2.17	B.
March	7,600	1,640	3,660	2.51	2.89	A.
April	16,400	3,300	5,880	4.03	4.50	A.
May	12,200	3,500	6,410	4.39	5.06	A.
June	4,630	1,230	2,190	1.50	1.67	A.
July	2,600	950	1,460	1.00	1.15	B.
August	5,460	1,290	2,180	1.49	1.72	A.
September	1,390	732	968	.663	.74	B.
October	1,080	750	910	.623	.72	B.
November	1,270	950	1,080	.740	.83	B.
December	1,120	750	945	.647	.75	B.
The year	16,400	732	2,550	1.75	23.77	

NOTE.—Discharge during the frozen periods 1907–8 based on the discharge at Garvins Falls and climatological reports.

	Second-feet.
Discharge January 17 to 31, 1907	1,610
March 1 to 9, 1907	1,070
January 30 to 31, 1908	2,100
February 1 to 15, 1908	1,650
December 30 to 31, 1908	750

Discharge for missing days interpolated, except July 1 to 19, August 24 and 25, September 28 and 29, and October 27, 1907, and January 16 to 21, April 5 and 12, May 30 and 31, 1908, which were estimated on the basis of the discharge at Plymouth and at Garvins Falls.

	Second-feet.
Discharge July 1 to 19, 1907	1,840
January 16 to 21, 1908	1,670

MERRIMAC RIVER AT GARVINS FALLS, N. H.

The power at Garvins Falls, 4 miles below Concord, is one of the best on Merrimac River. There has been a dam at this point since 1815, first in connection with the Old Bow Canal, and later to furnish power for a pulp mill. This privilege has since become the property of the Manchester Traction, Light and Power Company, and has been more completely developed. During 1903–4 an overfall dam of the ogee type, somewhat similar in cross section to the dam at Holyoke, was completed. This is 550 feet long between abutments and about 800 feet over all, including headgates, and is of stone masonry, substantially built. A canal has been completed which is about 500 feet long and 74 feet wide at the water line, and

wasteways are provided from the sides of this, one 90 feet long at elevation 102 (the main crest of the dam being taken as elevation 100) and another 45 feet long at elevation 103. A waste gate 10 feet wide and capable of being lowered to elevation 93 is also provided, for use especially in floating out any obstructions which lodge against the racks. The new dam and headgates to the canal are situated about 800 feet downstream from the old dam, which was destroyed on the completion of the new structure. There are six triplex turbines of somewhat over 1,000 horsepower each, and one small duplex turbine of 75 horsepower used in running exciters. Each large unit has three 39-inch runners, mounted on a horizontal shaft, which revolves at 180 revolutions a minute. Two of the wheels in each set discharge through a common T center and draft tube near the fore bay wall. The third wheel is set opposite a quarter turn at the downstream end of the casing and discharges through this quarter turn into a smaller draft tube. The top of the penstock opening is at elevation 95.5, while the lower ends of the draft tubes are horizontal and are about 2 feet below the level of usual tail water. The gates for the runners are of the plain cylindrical pattern without fingers and are controlled by governors. The average head on the wheels is about 29 feet and there are six 650-kilowatt 3-phase generators direct connected with the turbines. The power developed is transmitted at 12,000 volts tension to Manchester, about 14 miles away, where it enters a substation and is transformed to a lower voltage and through a distributing switch-board utilized for light and power purposes. The Garvins Falls station is one of a system of three water-power plants and one steam-power plant operated by this company.

Careful record of the pond and tail-race levels, wheel openings, etc., have been kept by the company since the completion of the new dam in 1904, and have been furnished for computations of flow by J. Brodie Smith, manager. The computations for 1907–8 have been made and results furnished by Hollis French & Allen Hubbard, consulting engineers for the power company. A number of current-meter measurements have been made from time to time by the hydrographers of the Survey for the purpose of rating turbines and to assist in computing flow over the dam.

Conditions are favorable at this station for accurate records of discharge. The flow over the dam is affected somewhat by ice during the winter.

The maximum daily discharge during the maintenance of the station occurred March 31, 1905, and was about 33,970 second-feet. Discharge for the minimum week occurred October 22 to 28, 1908, and averaged about 1,019 second-feet.

Daily discharge, in second-feet, of Merrimac River at Garvins Falls, N. H., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2,913	2,239	1,505	20,213	14,611	3,393	3,633	1,938	[a] 1,233	11,280	11,540	[a] 3,347
2	4,454	2,433	1,712	14,376	16,625	[a] 3,076	4,516	1,965	968	7,738	8,589	3,462
3	4,887	[a] 2,428	[a] 2,068	10,933	11,020	3,288	3,742	1,945	666	5,338	[a] 9,090	3,134
4	4,657	2,207	1,685	9,163	8,807	4,654	3,119	[a] 1,955	1,356	4,538	23,981	3,984
5	4,325	2,289	1,672	8,581	[a] 8,244	5,248	2,406	1,989	1,306	5,006	16,222	2,717
6	[a] 4,725	2,167	1,502	9,853	7,925	5,910	2,423	2,155	1,629	[a] 5,796	11,646	2,254
7	4,570	2,190	1,592	[a] 9,148	7,358	7,972	[a] 2,288	1,922	2,703	4,479	16,943	3,193
8	4,057	2,260	1,588	7,777	7,352	6,991	2,386	1,955	[a] 1,966	4,158	25,513	[a] 2,819
9	3,964	2,472	1,409	7,008	6,862	[a] 5,463	2,219	1,762	1,729	5,136	20,594	2,926
10	3,381	[a] 2,580	[a] 1,858	6,346	6,811	4,586	1,787	1,712	1,887	7,997	[a] 14,466	2,883
11	4,238	2,383	1,550	5,806	6,641	4,295	1,937	[a] 1,334	1,661	5,950	10,816	10,892
12	3,079	1,941	1,460	5,946	[a] 6,058	4,165	2,184	1,227	1,646	4,897	9,151	20,748
13	[a] 2,661	1,685	1,553	6,413	5,372	3,704	2,500	1,196	3,207	[a] 5,795	7,659	12,425
14	2,583	2,106	1,547	[a] 6,699	4,723	3,234	[a] 2,853	1,516	2,657	4,999	6,647	7,655
15	2,486	2,343	2,378	6,855	5,866	3,257	2,384	1,621	[a] 2,027	4,282	5,887	[a] 4,949
16	2,305	2,334	3,914	7,242	5,787	[a] 2,368	2,129	1,632	1,611	3,876	5,339	5,871
17	3,159	[a] 2,397	[a] 3,392	7,057	7,458	2,726	1,905	1,566	1,943	3,439	[a] 4,708	5,960
18	2,249	2,173	3,935	7,047	11,586	2,635	1,918	[a] 1,048	1,806	3,264	3,699	5,226
19	2,329	1,792	5,086	6,442	[a] 8,438	2,424	1,964	1,588	1,771	2,914	4,290	4,901
20	[a] 2,224	1,872	4,939	6,249	7,429	2,416	1,865	1,339	1,632	[a] 2,666	4,257	3,969
21	2,461	[b] 1,690	4,056	[a] 5,465	6,113	2,360	[a] 1,625	1,075	1,482	2,860	4,128	4,441
22	2,744	1,509	3,646	5,107	5,377	2,545	1,767	1,317	[a] 1,081	2,699	4,905	[a] 3,426
23	2,843	2,082	3,735	4,893	4,849	[a] 2,318	1,816	1,326	1,633	2,593	4,352	3,592
24	2,507	[a] 2,291	[a] 6,065	6,571	4,200	1,918	1,902	1,297	2,093	2,507	[a] 4,209	5,615
25	2,603	1,589	7,276	16,069	4,072	2,208	1,998	[a] 891	3,105	2,424	4,203	7,655
26	2,664	1,551	7,408	12,535	[a] 3,459	1,992	1,992	1,048	3,942	2,316	4,170	8,928
27	[a] 2,702	1,588	6,747	12,541	3,511	2,116	1,883	1,068	2,949	[a] 2,184	4,246	7,305
28	2,208	1,457	6,896	[a] 14,637	3,978	2,668	[a] 2,078	1,204	2,525	2,326	4,094	6,203
29	2,109	.....	8,465	12,917	4,683	2,717	2,033	1,202	[a] 2,707	8,672	3,860	[a] 5,940
30	2,169	.....	14,427	12,128	4,154	[a] 2,463	1,913	1,247	9,525	21,014	3,662	6,115
31	2,261	.....	[a] 20,412	.....	3,868	.....	1,795	1,233	.....	16,461	.....	6,355
1908.												
1	6,860	2,465	[a] 2,856	13,010	12,087	9,341	1,825	1,652	1,445	1,203	[a] 1,007	1,684
2	6,051	[a] 2,478	2,886	10,858	17,332	7,699	1,803	[a] 1,415	1,536	1,444	1,369	1,600
3	5,190	2,321	2,847	9,469	[a] 13,593	6,747	1,586	1,807	1,500	1,042	1,099	1,379
4	3,642	2,401	2,857	7,483	15,968	4,923	1,398	1,456	1,458	[a] 1,232	1,321	1,452
5	[a] 2,936	2,312	2,840	[a] 6,277	14,451	4,294	[a] 1,287	1,674	1,335	1,654	1,132	1,199
6	2,567	2,420	2,746	5,905	12,092	4,014	1,616	2,597	[a] 971	1,219	1,228	[a] 781
7	3,475	3,079	2,714	6,884	10,107	[a] 3,628	1,677	6,132	1,315	1,343	1,265	1,085
8	4,144	3,013	[a] 2,688	8,508	10,542	3,437	1,767	4,479	1,457	1,154	[a] 876	1,315
9	5,055	[a] 2,951	2,665	8,808	14,691	3,087	1,504	[a] 3,646	1,441	1,337	1,228	1,356
10	5,100	2,165	2,350	8,397	[a] 13,802	2,880	1,354	2,827	1,437	1,122	1,169	1,402
11	4,303	2,249	2,495	8,697	13,536	2,867	1,266	2,655	1,445	[a] 676	1,176	1,580
12	[a] 3,938	2,299	2,605	[a] 10,391	11,181	2,723	[a] 1,175	2,559	1,255	1,123	1,313	1,315
13	4,967	2,306	2,739	9,466	10,315	2,509	1,358	3,159	[a] 919	1,292	1,280	[a] 990
14	6,272	2,493	3,277	7,934	11,383	[a] 2,178	1,429	2,783	1,361	1,226	1,443	1,275
15	5,572	3,082	[a] 4,373	6,995	10,620	2,076	1,413	2,393	1,163	1,176	[a] 1,980	1,553
16	4,786	[a] 8,554	7,348	7,011	9,977	2,170	1,211	[a] 1,880	1,204	1,216	1,583	1,453
17	3,789	16,926	10,470	8,745	[a] 8,769	2,725	1,306	2,094	1,220	1,223	1,372	1,321
18	3,946	11,346	9,337	7,192	7,772	2,921	1,155	1,968	1,203	[a] 942	1,135	1,440
19	[a] 3,477	7,795	7,249	[a] 6,810	7,266	2,502	[a] 1,598	3,093	1,028	1,168	1,354	979
20	3,108	5,610	5,762	8,346	6,691	2,361	2,356	2,778	[a] 589	1,193	1,246	[a] 737
21	3,033	4,674	4,899	7,856	6,212	[a] 2,049	4,402	2,369	1,238	1,380	1,194	1,501
22	2,993	4,292	[a] 4,615	6,741	5,958	1,762	3,107	2,046	1,234	987	[a] 675	1,365
23	2,937	[a] 3,996	4,859	5,925	6,553	1,815	3,003	[a] 1,758	1,128	1,000	1,190	1,072
24	2,995	3,448	7,202	6,672	[a] 7,389	1,947	2,684	1,805	1,070	1,104	1,205	1,286
25	2,601	3,208	12,546	8,994	6,293	1,818	2,195	1,763	1,189	[a] 916	1,116	682
26	[a] 2,566	3,156	11,961	[a] 9,806	5,329	1,850	[a] 2,002	1,828	1,147	1,107	855	1,042
27	2,979	3,033	11,855	14,290	4,849	1,695	2,065	1,823	[a] 679	996	1,660	[a] 743
28	3,467	3,157	14,117	13,430	4,580	[a] 1,557	2,059	1,623	1,231	1,020	1,684	1,163
29	4,008	2,992	[a] 14,992	18,426	4,292	1,457	1,883	1,492	1,185	1,016	[a] 1,729	1,333
30	3,133	.....	17,334	17,413	3,869	1,795	1,808	[a] 1,232	1,240	1,446	2,168	1,288
31	2,822	.....	16,330	.....	[a] 4,738	.....	1,808	1,520	.....	1,347	.....	1,247

[a] Sundays. [b] Interpolated.

Monthly discharge of Merrimac River at Garvins Falls, N. H., for 1907–8.

[Drainage area, 2,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	4,890	2,110	3,110	1.33	1.53
February	2,580	1,460	2,070	.885	.92
March	20,400	1,410	4,370	1.87	2.16
April	20,200	4,890	9,070	3.88	4.33
May	16,600	3,460	6,890	2.94	3.39
June	7,970	1,920	3,500	1.50	1.67
July	4,520	1,620	2,290	.979	1.13
August	2,160	891	1,490	.637	.73
September	9,520	666	2,210	.944	1.05
October	21,000	2,180	5,470	2.34	2.70
November	25,500	3,660	8,760	3.74	4.17
December	20,700	2,250	5,770	2.47	2.85
The year	25,500	666	4,580	1.96	26.63
1908.					
January	6,860	2,570	3,960	1.69	1.95
February	16,900	2,160	4,150	1.77	1.91
March	17,300	2,350	6,580	2.81	3.24
April	18,400	5,900	9,220	3.94	4.40
May	17,300	3,870	9,430	4.03	4.65
June	9,340	1,460	3,090	1.32	1.47
July	4,400	1,160	1,840	.786	.91
August	6,130	1,230	2,330	.996	1.15
September	1,540	589	1,220	.521	.58
October	1,650	676	1,170	.500	.58
November	2,170	675	1,300	.556	.62
December	1,680	682	1,250	.534	.62
The year	18,409	589	3,800	1.62	22.08

NOTE.— The above mean monthly discharges for 1907–8 are rated as B.

MERRIMAC RIVER AT LAWRENCE, MASS.

Records of flow of the Merrimac at Lawrence have been kept for more than fifty years, but have been published only since 1890. Data in regard to the flow are furnished by R. A. Hale, principal assistant engineer of the Essex Water Power Company.

The station is located at the dam of the Essex Company in Lawrence, and a careful record is kept of the flow over the dam and through the various wheels and gates in connection with the sale of power to the various users. The nearest dam on the river upstream is at Lowell, about 12 miles away, while a short distance below the Lawrence dam the river is within reach of tidal effect at high tide.

Water is diverted from the drainage basins of Sudbury and Nashua rivers for use by the metropolitan district in the vicinity of Boston, but during a portion of the year water is wasted into the Merrimac at these diversion dams, consequently the drainage area is a somewhat variable quantity.

The drainage areas are as follows:

	Square miles.
Total of Merrimac River drainage basin above Lawrence	4,664
Nashua River drainage basin above gaging station at Clinton, Mass	118
Sudbury River drainage basin, Framingham, Dam No. 1	75
Cochituate River drainage basin	19
Total of Nashua, Sudbury, and Cochituate river drainage basins	212
Net drainage basin of Merrimac River, excluding Nashua, Sudbury, and Cochituate river basins	4,452

The quantity as measured at Lawrence includes the water from Sudbury, Nashua, and Cochituate rivers, and in getting the absolute yield of the river this should be considered in reference to the drainage areas, either by deducting it from the Merrimac flow and using the net area and the net flow of the Merrimac, or by getting the total yield of both the Sudbury and Nashua Rivers with the Merrimac and using the total area.

The accompanying tables, furnished by Mr. Hale, give the flow of the Merrimac and Lawrence, and also the quantity wasted from the Sudbury and Nashua drainage basins into the Merrimac, the latter being based on data furnished by the Metropolitan Water and Sewerage Board of Boston.

Much care is taken in procuring the base data used and in making computations, and these records are regarded as excellent.

The maximum daily discharge during the maintenance of the station occurred in March, 1896, and was about 82,150 second-feet, this being the greatest flood since that of 1846. The discharge for the minimum week occurred September 21 to 27, 1908, and averaged 1,240 second-feet.

Average weekly flow, arranged in order of dryness, of Merrimac River at Lawrence, Mass., for 1907–8.

Week ending Sunday.	Merrimac River at Lawrence (total drainage area=4,664 square miles).	Wasting into Merrimac from— Nashua River at Clinton (drainage area=118 square miles).	Sudbury River at Dam 1 (drainage area=75 square miles).	Lake Cochituate, Bannister Brook (drainage area=19 square miles).	Total waste of these watersheds (total drainage area=212 square miles).	Net yield of Merrimac River from 4,452 square miles (mean discharge in second-feet). Per week.	Per square mile.
	Mean weekly discharge in second-feet.						
1907.							
September 1	1,245	3	2	0	5	1,240	0.278
August 25	1,684	5	2	0	7	1,677	.377
September 8	2,042	5	2	0	7	2,035	.457
August 18	2,113	5	2	0	7	2,106	.473
September 22	2,321	6	2	0	8	2,313	.519
August 11	2,454	5	2	0	7	2,447	.550
August 4	2,602	6	2	0	8	2,594	.583
March 10	2,684	5	55	0	60	2,624	.589
September 15	2,701	6	2	0	8	2,693	.605
March 3	2,714	5	62	0	67	2,647	.595
July 28	2,721	6	2	0	8	2,713	.609
February 24	2,927	6	56	0	62	2,865	.643
February 17	3,039	6	86	0	92	2,947	.662
June 30	3,101	7	3	0	10	3,091	.694
July 21	3,159	5	2	0	7	3,152	.708
February 10	3,181	5	105	0	110	3,071	.690
October 27	3,215	6	2	0	8	3,207	.720
March 17	3,458	7	73	0	80	3,378	.759
July 14	3,468	6	2	0	8	3,460	.777
June 23	3,522	7	8	0	15	3,507	.788
February 3	3,568	5	73	0	78	3,490	.784
September 29	3,842	6	2	0	8	3,834	.861
July 7	3,972	5	2	0	7	3,965	.891
October 20	4,129	6	2	0	8	4,121	.926
January 20	4,240	6	79	0	85	4,155	.933
January 27	4,380	5	87	0	92	4,288	.963
December 8	5,490	7	86	0	93	5,397	1.212
June 2	5,932	5	49	17	71	5,861	1.316
June 16	6,063	7	38	4	49	6,014	1.351
October 13	6,764	7	2	0	9	6,755	1.517
May 26	7,480	6	36	17	59	7,421	1.667
November 24	7,603	7	70	0	77	7,526	1.690
December 1	8,377	7	137	0	144	8,233	1.849
October 6	8,715	6	2	0	8	8,707	1.955
December 22	8,746	7	88	0	95	8,651	1.943
January 6	8,767	7	195	0	202	8,565	1.924
June 9	8,931	7	94	37	138	8,793	1.975
January 13	9,152	6	118	0	124	9,028	2.028
May 12	9,253	6	27	31	64	9,189	2.064
May 19	9,271	6	48	21	75	9,196	2.066
April 14	10,937	6	161	0	167	10,770	2.419
March 24	11,093	6	172	0	178	10,915	2.452
April 21	11,336	6	119	20	145	11,191	2.514
December 29	11,838	7	145	0	152	11,686	2.625
April 28	12,394	6	86	20	112	12,282	2.759
November 17	12,539	7	97	0	104	12,435	2.793
November 3	12,644	7	4	0	11	12,633	2.838
December 15	12,757	7	127	0	134	12,623	2.835
May 5	14,036	6	65	20	91	13,945	3.132
March 31	16,475	6	113	0	119	16,356	3.674
April 7	17,397	5	92	0	97	17,300	3.886
November 10	22,978	8	77	0	85	22,893	5.142
Weekly average	6,836	6	57	4	67	6,769	1.520

Average weekly flow, arranged in order of dryness, of Merrimac River at Lawrence, Mass., for 1907–8—Continued.

Week ending Sunday—	Merrimac River at Lawrence (total drainage area=4,664 square miles).	Wasting into Merrimac from—				Net yield of Merrimac River from 4,452 square miles (mean discharge in second-feet).	
		Nashua River at Clinton (drainage area=118 square miles).	Sudbury River at Dam 1 (drainage area=75 square miles).	Lake Cochituate, Bannister Brook (drainage area=19 square miles).	Total waste of these watersheds (total drainage area=212 square miles).	Per week.	Per square mile.
	Mean weekly discharge in second-feet.						
1908.							
September 27	1,240	5	2	0	7	1,233	0.217
November 1	1,365	6	2	0	8	1,357	.305
December 27	1,418	4	7	0	11	1,407	.316
October 11	1,463	5	2	0	7	1,456	.327
October 4	1,464	5	2	0	7	1,457	.327
November 29	1,475	4	5	0	9	1,466	.329
October 25	1,480	5	2	0	7	1,473	.331
October 18	1,497	5	2	0	7	1,490	.335
November 15	1,614	5	14	0	19	1,595	.358
November 22	1,618	5	4	0	9	1,609	.361
November 8	1,699	5	18	0	23	1,676	.376
July 19	1,732	4	2	0	6	1,726	.388
September 20	1,769	5	2	0	7	1,762	.396
September 13	1,822	4	4	0	8	1,814	.407
December 13	1,963	5	20	0	25	1,938	.435
December 6	1,979	5	3	0	8	1,971	.443
September 6	2,049	1	5	0	6	2,043	.459
December 20	2,057	5	14	0	19	2,038	.458
July 5	2,151	6	2	0	8	2,143	.481
June 28	2,220	6	2	0	8	2,212	.497
July 12	2,256	5	2	0	7	2,249	.505
August 30	2,407	1	8	0	9	2,398	.539
August 2	2,427	5	2	0	7	2,420	.544
August 23	2,704	5	8	0	13	2,691	.604
June 21	2,778	5	2	0	7	2,771	.622
July 26	2,834	4	2	0	6	2,828	.635
August 16	3,586	6	25	0	31	3,555	.799
June 14	3,906	4	11	1	16	3,890	.874
August 9	3,982	5	3	0	8	3,974	.893
February 9	4,307	5	102	2	109	4,198	.943
February 2	5,959	5	114	38	157	5,802	1.303
January 26	6,030	5	93	21	119	5,911	1.328
March 8	6,059	4	123	49	176	5,883	1.321
February 16	6,306	4	128	11	143	6,163	1.384
March 1	6,519	4	106	45	155	6,364	1.430
May 31	6,583	129	92	31	252	6,331	1.422
March 15	7,515	3	176	49	228	7,287	1.637
June 7	8,171	45	91	24	160	8,011	1.799
May 24	8,735	19	67	14	100	8,635	1.940
January 12	9,671	4	138	25	167	9,504	2.135
April 26	9,861	4	72	20	96	9,765	2.193
April 19	10,640	4	107	27	138	10,502	2.359
January 19	11,115	5	153	51	209	10,906	2.450
January 5	11,322	5	117	21	143	11,179	2.511
April 12	11,537	4	172	33	209	11,328	2.544
February 23	13,394	4	153	35	192	13,202	2.965
May 17	13,785	9	89	18	116	13,669	3.070
March 22	13,880	3	224	59	286	13,594	3.053
May 10	15,354	3	80	34	117	15,237	3.422
May 3	15,549	4	25	0	29	15,520	3.486
March 29	15,740	66	209	52	327	15,413	3.462
April 5	16,933	125	230	49	404	16,529	3.713
Weekly average	5,691	11	58	13	84	5,607	1.259

Daily discharge, in second-feet, of Merrimac River at Lawrence, Mass., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4,474	3,476	3,025	*27,271*	14,731	4,299	4,552	2,806	[a] 606	14,439	15,769	[a] 6,717
2	6,692	2,214	2,269	22,680	*17,411*	[a] 4,913	4,526	2,921	1,713	10,646	11,427	7,150
3	7,174	[a] 2,598	[a] *504*	17,667	15,068	6,283	*5,129*	1,815	2,859	7,553	[a] 11,027	6,225
4	8,817	*4,901*	3,591	14,800	11,149	7,516	3,509	[a] 341	2,645	5,993	21,231	5,936
5	14,850	3,806	3,214	13,304	[a] 10,130	9,369	4,456	*3,264*	2,711	5,087	21,119	5,778
6	[a] *15,038*	3,303	3,011	13,019	10,904	9,433	2,999	3,092	2,655	[a] 5,284	15,329	5,191
7	14,821	3,194	3,010	[a] 13,038	9,952	*10,599*	[a] 2,634	2,989	1,596	5,838	19,805	*3,546*
8	13,409	3,467	3,034	12,588	9,392	10,557	4,640	2,770	[a] *115*	5,742	*32,330*	[a] 4,601
9	10,793	2,326	2,282	11,388	9,113	[a] 8,763	3,812	2,850	2,775	6,854	29,646	6,025
10	7,720	[a] 1,273	[a] 647	10,062	8,929	8,402	3,738	1,881	3,083	10,139	[a] 21,388	5,802
11	6,865	4,640	4,056	9,855	8,283	7,252	3,493	[a] 332	2,838	8,180	18,155	9,993
12	5,453	3,477	3,304	10,112	[a] 8,199	6,689	3,338	2,950	2,830	5,892	15,643	*23,387*
13	[a] 5,004	3,218	3,046	10,996	8,462	6,241	2,225	2,764	2,708	[a] 4,703	13,699	19,880
14	6,409	3,172	2,920	[a] 11,558	7,529	5,651	[a] 3,032	2,690	1,762	6,196	12,057	13,899
15	4,866	3,330	3,247	12,506	6,726	4,069	5,028	2,502	[a] 2,914	5,170	10,666	[a] 10,314
16	4,639	2,299	2,704	12,646	7,950	[a] 4,139	4,158	2,281	3,698	4,621	9,295	10,074
17	4,533	[a] 1,136	[a] 4,927	12,357	8,665	5,642	3,459	1,473	2,856	4,247	[a] 8,256	10,295
18	4,094	4,550	9,430	11,748	13,348	4,147	3,311	[a] *132*	2,502	3,921	8,688	9,865
19	*2,446*	3,504	10,940	10,939	[a] 12,214	3,622	3,181	1,830	2,556	2,815	7,682	9,021
20	[a] 2,695	3,105	10,940	10,061	10,763	3,553	2,518	1,857	2,673	[a] 1,936	7,787	8,124
21	5,911	3,132	9,640	[a] 9,098	9,384	3,476	[a] *456*	2,014	1,789	4,135	7,503	7,055
22	5,373	3,304	10,671	9,333	8,185	2,250	3,949	2,141	[a] 176	3,908	7,413	[a] 6,791
23	5,013	2,308	11,243	7,*815*	7,360	[a] 1,965	3,129	2,348	2,426	3,711	7,310	8,074
24	4,774	[a] *583*	[a] 14,784	8,640	6,561	4,652	3,121	1,235	2,969	3,626	[a] *6,837*	9,257
25	4,345	4,346	15,302	13,802	5,180	3,517	3,024	[a] 363	4,856	3,650	8,200	13,956
26	2,747	3,324	14,043	17,572	[a] *4,929*	3,246	2,735	1,664	5,508	2,374	8,836	15,597
27	[a] 2,496	2,799	13,337	14,134	6,311	3,191	2,067	1,356	4,921	[a] *1,099*	9,741	13,315
28	5,566	2,734	13,364	[a] 15,465	7,011	3,241	[a] 1,021	1,262	3,043	3,693	8,530	11,473
29	3,838	.....	15,504	15,533	6,565	2,044	4,030	1,290	[a] 3,172	5,535	8,903	[a] 11,193
30	3,634	.....	19,465	14,232	6,173	[a] *1,815*	3,214	1,321	*12,005*	20,272	7,709	12,288
31	3,647	.....	[a] *24,309*	.....	6,253	.....	3,086	1,214	.....	*20,783*	.....	13,355
1908.												
1	14,082	4,787	[a] 6,039	*19,608*	14,835	11,442	2,821	1,172	2,670	1,901	[a] *131*	2,749
2	12,632	[a] 4,708	6,712	16,676	16,159	*12,045*	2,772	[a] *177*	2,592	*2,001*	2,032	2,512
3	10,945	6,421	6,635	14,666	[a] 16,624	9,640	2,253	2,800	2,544	1,146	2,175	2,194
4	8,580	5,002	6,252	12,562	15,990	7,763	370	2,778	2,253	[a] 144	2,225	2,191
5	[a] 7,370	4,348	5,977	[a] 10,021	14,592	6,378	[a] 576	2,713	1,401	1,662	2,195	1,318
6	7,449	4,198	5,699	9,832	14,430	5,211	3,380	3,032	[a] 417	1,699	1,949	[a] 167
7	6,975	3,508	*5,479*	9,823	12,248	[a] 4,716	2,760	5,079	397	1,782	1,112	2,326
8	9,520	*3,033*	[a] 5,658	11,038	13,013	5,734	2,684	*6,571*	2,925	1,928	[a] 204	2,507
9	12,691	[a] 3,639	7,361	12,693	18,391	5,323	2,693	[a] 4,898	*2,947*	1,907	1,963	2,466
10	11,720	5,148	6,312	12,615	[a] *18,817*	3,230	2,418	5,008	2,749	1,115	2,021	2,318
11	9,946	4,031	6,264	12,312	17,833	4,010	1,574	4,089	2,184	[a] 146	2,060	2,313
12	[a] 9,399	3,902	5,957	[a] 12,445	15,230	3,720	[a] 285	3,697	1,413	1,891	1,973	1,509
13	13,389	3,788	7,065	13,046	13,352	2,637	1,976	3,461	[a] 138	1,959	1,961	[a] 305
14	*15,579*	3,520	9,091	11,438	12,643	[a] 2,686	2,063	3,526	2,240	1,894	1,096	2,434
15	12,924	5,846	[a] 10,558	10,140	13,084	4,389	2,255	2,985	2,277	1,853	[a] 222	*2,764*
16	11,267	[a] 17,905	15,654	9,768	13,008	3,379	2,513	[a] 2,333	2,254	1,763	1,968	2,687
17	8,869	*22,895*	19,604	10,561	[a] 11,345	3,047	2,048	3,690	2,181	1,034	1,962	2,263
18	8,251	21,019	17,322	10,094	10,527	2,796	1,191	3,385	1,982	[a] *88*	1,983	2,333
19	[a] 7,525	15,069	14,299	[a] 9,436	9,673	3,277	[a] *80*	2,862	1,380	1,744	1,993	1,537
20	7,525	10,539	11,600	10,418	8,858	1,743	2,116	2,678	[a] *70*	1,852	2,008	[a] 381
21	6,347	9,137	9,862	11,287	8,235	[a] 818	2,718	2,555	1,658	1,882	1,225	2,342
22	6,650	7,977	[a] 8,822	10,031	7,564	2,711	4,018	1,866	1,541	1,894	[a] 184	2,218
23	6,404	[a] 7,122	9,071	8,794	7,838	2,708	*4,177*	[a] 1,891	1,545	1,829	2,075	2,263
24	5,364	7,437	10,783	*8,482*	[a] 8,453	2,784	3,102	3,826	1,529	1,069	2,146	2,114
25	*4,668*	6,275	17,382	9,366	9,074	2,693	1,889	2,812	1,523	[a] 90	2,139	*139*
26	[a] 5,253	5,879	18,211	[a] 10,650	7,789	2,493	[a] 1,815	2,762	852	1,701	377	676
27	6,658	6,647	16,612	12,513	6,897	1,653	3,946	2,771	[a] 73	1,588	2,064	[a] 174
28	6,537	6,844	18,540	14,798	6,063	[a] *499*	3,332	2,731	1,511	1,541	1,216	2,412
29	7,235	6,511	[a] 19,578	15,888	5,414	3,401	2,876	1,560	1,674	1,553	[a] 306	2,294
30	6,568	.....	*22,530*	18,024	*4,832*	2,866	2,946	[a] 388	1,870	1,842	*2,724*	2,274
31	5,221	.....	22,470	.....	[a] 6,010	.....	2,538	2,465	.....	1,199	.....	2,284

[a] Sunday.

NOTE.—Maximum and minimum appear in italics.

Monthly discharge of Merrimac River at Lawrence, Mass., for 1907–8.

Month.	Mean discharge of Merrimac River at Lawrence, as measured. (Total drainage area=4664 square miles.)	Amount wasting into Merrimac River from watershed.				Average yield of Merrimac River from watershed of 4,452 square miles.		Run-off depth in inches on drainage area.
		Nashua River at Clinton.	Sudbury River at Dam 1.	Lake Cochituate, Bannister Brook.	Total.			
		118 sq. m.	75 sq. m.	19 sq. m.	212 sq. m.			
		Second-feet.				Second-feet.	Second-feet per square mile.	
1907.								
January	6,400	6	111	0	117	6,283	1.411	1.63
February	3,054	6	79	0	85	2,969	.667	.69
March	7,799	6	100	0	106	7,693	1.728	1.99
April	13,141	6	112	11	129	13,012	2.923	3.26
May	9,124	6	43	21	70	9,054	2.034	2.34
June	5,351	7	37	11	55	5,296	1.190	1.33
July	3,341	6	2	0	8	3,333	.749	.86
August	1,927	5	2	0	7	1,920	.431	.50
September	2,965	6	2	0	8	2,957	.664	.74
October	6,388	6	2	0	8	6,380	1.433	1.65
November	13,066	7	87	0	94	12,972	2.914	3.25
December	9,812	7	113	0	120	9,692	2.177	2.51
The year.	6,864	6.2	58	3.6	67	6,797	1.527	20.75
1908.								
January	8,824	5	121	33	159	8,665	1.946	2.24
February	7,487	4	124	24	152	7,335	1.648	1.78
March	11,400	35	188	52	275	11,125	2.499	2.88
April	11,967	14	118	27	159	11,808	2.652	2.96
May	11,575	36	77	22	135	11,440	2.570	2.96
June	4,193	14	25	6	45	4,148	.932	1.04
July	2,329	5	2	0	7	2,322	.522	.60
August	2,986	4	10	0	14	2,972	.668	.77
September	1,693	4	3	0	7	1,686	.379	.42
October	1,474	5	2	0	7	1,467	.330	.38
November	1,590	5	10	0	15	1,575	.354	.40
December	1,886	5	11	0	16	1,870	.420	.48
The year.	5,617	11	58	14	83	5,534	1.243	16.91

CONTOOCOOK RIVER AT WEST HOPKINTON, N. H.

This station, which is located at the wooden highway bridge at West Hopkinton, N. H., was established July 9, 1903, to obtain general statistical data regarding flow, and discontinued May 1, 1907.

It is about 5 miles above the entrance of Warner River. During the winter months the discharge is so affected by ice that the station is discontinued. Conditions for obtaining accurate discharge data during the rest of the year are fairly good and a good rating curve has been determined.

The gage datum has remained the same during the maintenance of the station.

Daily gage height, in feet, of Contoocook River at West Hopkinton, N. H., for 1907.

[Frank H. Carr, observer.]

Day.	Jan.	Apr.	Day.	Jan.	Apr.	Day.	Jan.	Apr.
1	4.35	5.9	11	4.6	4.05	21		4.0
2	4.9	5.4	12	4.45	4.15	22		3.85
3	4.65	5.0	13	4.95	4.25	23		3.8
4	5.6	4.8	14	5.3	4.3	24		4.2
5	6.35	4.7	15	5.5	4.55	25		5.05
6	5.7	4.75	16		4.7	26		4.9
7	5.1	4.45	17		4.6	27		4.75
8	4.8	4.2	18		4.45	28		4.5
9	4.65	4.1	19		4.25	29		4.25
10	4.75	4.0	20		4.15	30		4.1

NOTE.—Ice conditions prevailed January to March.

Rating table for Contoocook River at West Hopkinton, N. H., for 1905–7.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.40	185	3.70	882	5.00	2,290	6.60	4,694
2.50	209	3.80	967	5.10	2,420	6.80	5,022
2.60	237	3.90	1,056	5.20	2,550	7.00	5,350
2.70	270	4.00	1,150	5.30	2,685	7.20	5,678
2.80	308	4.10	1,250	5.40	2,820	7.40	6,006
2.90	352	4.20	1,355	5.50	2,960	7.60	6,334
3.00	402	4.30	1,465	5.60	3,100	7.80	6,662
3.10	457	4.40	1,575	5.70	3,245	8.00	6,990
3.20	517	4.50	1,690	5.80	3,395	8.20	7,318
3.30	582	4.60	1,805	5.90	3,550	8.40	7,646
3.40	651	4.70	1,925	6.00	3,710	8.60	7,974
3.50	724	4.80	2,045	6.20	4,038	8.80	8,302
3.60	801	4.90	2,165	6.40	4,366	9.00	8,630

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 12 discharge measurements made during 1905–6 and is well defined between gage heights 2.4 feet and 9 feet.

Monthly discharge of Contoocook River at West Hopkinton, N. H., for 1907.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January			660	1.61	1.86	D.
February			390	.951	.99	D.
March			900	2.20	2.54	D.
April	3,550	967	1,680	4.10	4.57	A.

NOTE.—Discharge during January to March based on the run-off per square mile of the drainage area below Franklin Junction and above Garvins Falls as determined from the subtraction of the former from the latter.

SOUTH BRANCH OF NASHUA RIVER AT CLINTON, MASS.

Since July, 1896, the flow of South Branch of Nashua River has been measured at Clinton by the engineers of the Metropolitan Water and Sewerage Board. The results of these measurements have been furnished by Dexter Brackett, chief engineer. A large reservoir, storing about 8.5 billion cubic feet has been constructed at

Clinton, Mass., and water stored since 1903. Beginning with 1897 the flow has been corrected for gain and loss of storage in reservoirs and mill ponds on the watershed, so that the results show the natural flow of the stream. The accompanying tables give data upon discharge and precipitation for 1907–8, also the average for the years 1897–1908, inclusive, precipitation being based upon records at several stations in the Nashua drainage basin.

Yield and rainfall in South Branch of Nashua River basin at Clinton, Mass., for 1907–8.

[Drainage area, 118.19 square miles.[a]]

Month.	Total yield in million gallons.	Average yield per square mile.		Rainfall in inches.[b]	Rainfall collected in inches.[b]	Per cent collected.
		Million gallons per day.	Second-feet.			
1907.						
January	5,380.4	1.458	2.257	2.84	2.601	91.6
February	2,305.1	0.692	1.070	2.32	1.115	48.0
March	6,261.8	1.697	2.626	1.82	3.028	166.3
April	5,125.7	1.436	2.221	2.65	2.479	93.5
May	3,561.7	0.965	1.494	2.96	1.722	58.2
June	2,760.1	0.773	1.196	3.54	1.334	37.7
July	1,235.2	0.335	0.518	3.03	0.597	19.7
August	321.4	0.087	0.135	1.26	0.155	12.4
September	2,892.6	0.810	1.254	9.50	1.399	14.7
October	5,098.1	1.382	2.138	5.68	2.465	43.4
November	9,066.8	2.540	3.930	5.74	4.384	76.4
December	7,235.8	1.961	3.035	4.40	3.499	79.5
The year	51,244.7	1.180	1.825	45.74	24.778	54.2
1908.						
January	6,368.8	1.738	2.689	3.398	3.101	91.3
February	5,948.5	1.736	2.685	4.823	2.896	60.1
March	8,030.7	2,192	3.391	2.770	3.910	141.2
April	4,499.8	1,269	1.964	2.623	2.191	83.5
May	5,183.4	1.415	2.188	5.338	2.524	47.3
June	1,429.3	0.403	0.624	1.290	0.696	53.9
July	807.2	0.220	0.341	3.853	0.393	10.2
August	1,622.8	0.443	0.685	6.493	0.790	12.2
September	310.6	0.088	0.136	1.040	0.151	14.5
October	579.9	0.158	0.245	2.123	0.282	13.3
November	444.3	0.125	0.194	1.050	0.216	20.6
December	1,419.2	0.387	0.599	3.033	0.691	22.8
The year	36,644.5	0.847	1.311	37.834	17.841	47.2
1897–1908.						
January	55,147.6	1.254	1.940	3.655	2.237	61.2
February	55,035.0	1.378	2.131	3.725	2.233	59.9
March	126,261.9	2.872	4.443	4.499	5.123	113.9
April	97,834.2	2.299	3.557	3.916	3.969	101.4
May	55,232.4	1.256	1.944	3.609	2.241	62.1
June	36,896.1	0.867	1.342	4.235	1.497	35.3
July	21,701.1	0.494	0.764	4.440	0.880	19.8
August	21,138.4	0.481	0.744	4.311	0.858	19.9
September	18.793.3	0.442	0.683	4.025	0.762	18.9
October	27,110.1	0.617	0.954	3.634	1.100	30.3
November	38,347.5	0.901	1.394	3.475	1.556	44.8
December	62,338.2	1.418	2.194	4.541	2.529	55.7
The period	615,835.8	1.189	1.840	48.065	24.985	52.0

[a] Area of watershed from 1897 to 1907=119 square miles. Area of watershed for 1908=118.19 square miles.
[b] Total for month for 1907–8; average of totals per calendar month 1897 to 1908.

SUDBURY RIVER AT FRAMINGHAM AND LAKE COCHITUATE AT COCHITUATE, MASS.

Sudbury River, a small stream of eastern Massachusetts, receives water from an area west of Framingham. It flows thence in a northerly course through meadows and swamps and joins Assabet River to form Concord River, which in turn continues northward, entering Merrimac River immediately below the city of Lowell. Storage reservoirs have been constructed by the city of Boston and the Metropolitan Water and Sewerage Board, controlling the greater part of the flow from this basin.

Lake Cochituate drains into Sudbury River a short distance below Framingham. It is controlled as a storage reservoir by the Metropolitan waterworks.

Sudbury River and Lake Cochituate have been studied by the engineers of the city of Boston, the State Board of Health of Massachusetts, and the Metropolitan Water and Sewerage Board, and records of rainfall in the Sudbury basin have been kept since 1875, and in the Cochituate basin since 1852, but the latter are considered of doubtful accuracy previous to 1872.

The accompanying tables, furnished by Dexter Brackett, chief engineer, give data regarding discharge and precipitation for 1907–8, also the average for thirty-four years for Sudbury River, and for forty-six years for Lake Cochituate. (See also footnote, p. 343.)

Yield and rainfall in Sudbury River basin at Framingham, Mass., for 1907–8.

[Drainage area, 75.2 square miles.]

Month.	Total yield in million gallons.	Average yield per square mile.		Rainfall in inches.[a]	Rainfall collected in inches.[a]	Per cent collected.
		Million gallons per day.	Second-feet.			
1907.						
January	3,150.3	1.351	2.091	3.28	2.411	73.4
February	1,313.3	0.624	0.965	2.17	1.005	46.3
March	3,865.4	1.658	2.565	1.91	2.958	154.6
April	3,626.0	1.607	2.487	3.41	2.774	81.5
May	2,069.5	0.888	1.374	3.63	1,584	43.6
June	1,717.7	0.761	1.178	3.53	1.314	37.2
July	20.5	0.009	0.014	1.86	0.015	0.9
August	−243.0	−0.104	−0.161	1.07	−0.186	−17.4
September	1,220.5	0.541	0.837	8.76	0.934	10.7
October	1,726.7	0.741	1.146	4.17	1.321	31.7
November	4,507.8	1.998	3.092	6.12	3.450	56.4
December	4,736.0	2.032	3.143	4.47	3.624	81.1
The year	27,710.7	1.010	1.562	44.38	21.204	47.8

[a] Total for month for 1907–8; average of totals per calendar month 1875 to 1908.

Yield and rainfall in Sudbury River basin at Framingham, Mass., for 1907–8—Con.

Month.	Total yield in million gallons.	Average yield per square mile.		Rainfall in inches.[a]	Rainfall collected in inches.[a]	Per cent collected.
		Million gallons per day.	Second-feet.			
1908.						
January	4,487.6	1.925	2.978	3.600	3.434	95.4
February	3,350.4	1.536	2.377	4.558	2.564	56.3
March	5,261.7	2.257	3.492	3.818	4.026	105.5
April	2,520.4	1.117	1.729	1.880	1.929	102.6
May	2,437.5	1.046	1.618	5.505	1.865	33.9
June	438.6	.194	.301	.863	.335	38.9
July	− 32.8	− .014	− .022	3.705	− .025	− .7
August	236.7	.102	.157	4.573	.181	4.0
September	−184.5	− .082	− .127	.973	− .141	−14.5
October	108.9	.047	.072	2.550	.083	3.3
November	159.9	.071	.110	.978	.122	12.5
December	317.1	.136	.210	3.145	.243	7.7
The year	19,101.5	.694	1.074	36.148	14.616	40.4
1875–1908.						
January	98,652.6	1.245	1.925	4.141	2.220	53.6
February	126,067.1	1.746	2.701	4.176	2.837	67.9
March	229,420.7	2.894	4.477	4.500	5.163	114.7
April	157,443.3	2.053	3.175	3.504	3.543	101.1
May	87,494.5	1.104	1.708	3.425	1.969	57.5
June	40,131.7	.523	.809	3.114	.903	29.0
July	14,841.6	.187	.290	3.663	.334	9.1
August	21,019.3	.265	.410	3.913	.473	12.1
September	20,007.7	.261	.404	3.515	.450	12.8
October	38,301.3	.483	.747	4.071	.862	21.2
November	65,163.7	.850	1.314	3.840	1.467	38.2
December	84,353.4	1.064	1.646	3.840	1.899	49.4
The period	982,896.9	1.053	1.629	45.702	22.120	48.4

[a] Total for month for 1907–8; average of totals per calendar month 1875 to 1908.

Yield and rainfall in Lake Cochituate basin at Cochituate, Mass., for 1907–8.

[Drainage area, 18.87 square miles.]

Month.	Total yield, million gallons.	Average yield per square mile.		Rainfall in inches.[a]	Rainfall collected in inches.[a]	Per cent collected.
		Million gallons per day.	Second-feet.			
1907.						
January	622.0	1.063	1.645	3.14	1.90	60.4
February	308.2	.583	.903	2.18	.94	43.1
March	779.1	1.332	2.061	1.88	2.38	126.4
April	718.5	1.269	1.964	3.47	2.19	63.1
May	468.1	.800	1.238	3.62	1.43	39.4
June	330.0	.583	.902	2.89	1.01	34.8
July	40.7	.070	.108	1.45	.12	8.6
August	95.4	.163	.252	1.27	.29	22.9
September	348.3	.615	.952	7.62	1.06	13.9
October	370.9	.639	.988	3.96	1.13	28.6
November	863.8	1.526	2.361	5.63	2.63	46.8
December	942.0	1.610	2.492	3.66	2.87	78.5
The year	5,887.0	.855	1.322	40.77	17.95	44.0

[a] Total for month for 1907–8; average of totals per calendar month 1863 to 1908.

Yield and rainfall in Lake Cochituate basin at Cochituate, Mass., for 1907–8—Con.

Month.	Total yield, million gallons.	Average yield per square mile.		Rainfall in inches.[a]	Rainfall collected in inches.[a]	Per cent collected.
		Millon gallons per day.	Second-feet.			
1908.						
January	774.8	1.325	2.049	3.33	2.363	71.0
February	853.2	1.559	2.412	4.30	2.602	60.5
March	1,113.9	1.904	2.946	3.62	3.396	93.8
April	559.2	.988	1.528	1.80	1.705	94.7
May	503.4	.861	1.331	4.58	1.535	33.5
June	115.2	.203	.315	.82	.351	42.8
July	92.5	.158	.245	3.91	.282	7.2
August	69.7	.119	.184	3.98	.213	5.3
September	−10.8	−.019	−.030	.77	−.033	−4.3
October	40.9	.070	.108	2.37	.125	5.3
November	44.9	.079	.123	.85	.137	16.1
December	146.5	.250	.387	2.70	.447	16.5
The year	4,303.4	.623	.964	33.03	13.123	39.7
1863–1908.						
January	30,223.6	1.123	1.737	3.916	2.003	51.2
February	37,651.9	1.536	2.376	3.923	2.496	63.6
March	59,099.9	2.196	3.398	4.395	3.917	89.1
April	44,219.6	1.698	2.627	3.610	2.931	81.2
May	26,195.5	.973	1.506	3.724	1.736	46.6
June	12,087.7	.464	.718	3.024	.801	26.5
July	7,772.7	.289	.447	4.027	.515	12.8
August	11,036.1	.410	.634	4.250	.731	17.2
September	11,128.9	.427	.661	3.598	.738	20.5
October	15,248.2	.567	.877	4.260	1.011	23.7
November	20,979.1	.806	1.246	4.049	1.391	34.3
December	25,535.2	.949	1.468	3.567	1.692	47.4
The period	301,178.4	.950	1.470	46.343	19.965	43.1

[a] Total for month for 1907–8; average of totals per calendar month 1863 to 1908.

CONNECTICUT RIVER DRAINAGE BASIN.

DESCRIPTION.

Connecticut River has its source in the Connecticut lakes in northern New Hampshire. Its extreme headwaters, however, lie in the province of Quebec and in the mountains of the northern boundary of New Hampshire, whence the river flows in a southerly direction between New Hampshire and Vermont and through Massachusetts and Connecticut to Long Island Sound. It is the largest river in New England except the St. John, has a total length of about 345 miles and total drainage area of 11,085 square miles, of which about 155 square miles lie in the province of Quebec.

The Connecticut has numerous important tributaries, among which are Passumpsic, Ammonoosuc, Wells, White, Mascoma, Ottaquechee, Sugar, West, and Ashuelot rivers, all entering it north of the Massachusetts line; Millers, Deerfield, Chicopee, and Westfield rivers, entering it in the State of Massachusetts; and Farmington River, entering it near Hartford, Conn.

From its headwaters in the Connecticut lakes to Long Island Sound the Connecticut falls about 1,900 feet. The upper portions of the drainage area are rugged and the surface of the country is broken by

undulating ridges, which here and there rise to mountain heights, and is generally forested. In central and southern New Hampshire and Vermont the country is hilly, and the tributary streams in general have a good fall, but more of the area is in cultivation. In Massachusetts the Deerfield and Westfield rivers, with their sources in the Berkshires, are quick-spilling streams with steep slopes and narrow valleys, largely wooded, while on the east the Millers and Chicopee rivers drain a flatter country with numerous ponds and reservoirs. In Connecticut the river valley is generally broad and the country rolling. The soil in this portion is very fertile, and it is an important farming district.

The rocks are in general granite, gneiss, mica slate, and mica schists. An exception to this is the red sandstone in the Connecticut Valley, extending from New Haven nearly to the northern boundary of Massachusetts. The prevailing surface material is glacial drift.

The mean annual precipitation in the Connecticut Valley is about 40 inches, varying from about 47 inches at Hartford to probably about 35 inches in the extreme upper portions. In a general way, there is usually a difference of a month in the time of beginning of the spring season in the lower portion of the river and its headwaters, and this tends to diminish the severity of floods from melting snow and equalize the spring run-off. The range in winter conditions is also somewhat variable, the lower courses of the river being subject usually to several thaws, while the upper third of the river usually remains frozen throughout the winter, and considerable depths of snow accumulate. The river is navigable to Hartford, and by smaller boats as far as Holyoke.

The natural facilities for storage on the Connecticut River are perhaps less than on many of the New England rivers, although on Millers, Chicopee, and Farmington rivers some storage has been developed. There are, however, many localities in this basin where reservoirs could be constructed, and there is much need of systematic effort in this direction as the low-water flow on the Connecticut could be much improved by utilizing some of these opportunities for storage, especially in the upper portions of the basin.

The Connecticut and its tributaries are very important for water power. On the main river the developments at Wilder, Bellows Falls, Turners Falls, Holyoke, etc., are all large powers utilized for various manufactures. During the last season a hydro-electric power station on the Connecticut at Hinsdale, N. H., has been nearly completed, and this will furnish power for cities as far away as Fitchburg and Worcester. Plate V, *B*, shows a hydro-electric power development on White River near Sharon, Vt. There is, however, much undeveloped power in this basin which is bound to receive attention in the near future.

The longest record of flow in the Connecticut is at Holyoke, Mass., and extends back to 1880; this record was interrupted in 1899, but since 1904 the station at Sunderland is available for comparative purposes. The driest year during the period covered by these records was 1883, and the wettest 1888, the total flow during these two years being about in the ratio of 1 to 2.14.

The following river stations have been maintained in this river basin:

Connecticut River at Orford, N. H. (1900–1908).
Connecticut River at Sunderland, Mass. (1904–1908).
Connecticut River at Holyoke, Mass. (1880–1898).
Connecticut River at Hartford, Conn. (1896–1908).
Israel River above South Branch at Jefferson Highlands, N. H. (1903–1906).
Israel River below South Branch at Jefferson Highlands, N. H. (1903–1907).
Passumpsic River at St. Johnsbury Center, Vt. (1903).
Ammonoosuc River at Bretton Woods, N. H. (1903–1907).
Zealand River at Twin Mountain, N. H. (1903–1907).
Little River at Twin Mountain, N. H. (1904–1907).
White River at Sharon, Vt. (1903–4).
Ashuelot River at Winchester, N. H. (1903–4).
Ashuelot River at Hinsdale, N. H. (1907–8.)
Deerfield River at Deerfield, Mass. (1904–5).
Ware River at Ware, Mass. (1904–1908).
Quaboag River at West Warren, Mass. (1904–1907).
Westfield River at Russell, Mass. (1904–5).
Westfield Little River at Blandford, Mass. (1905–1908).
Salmon River at Leesville, Conn. (1905–6).

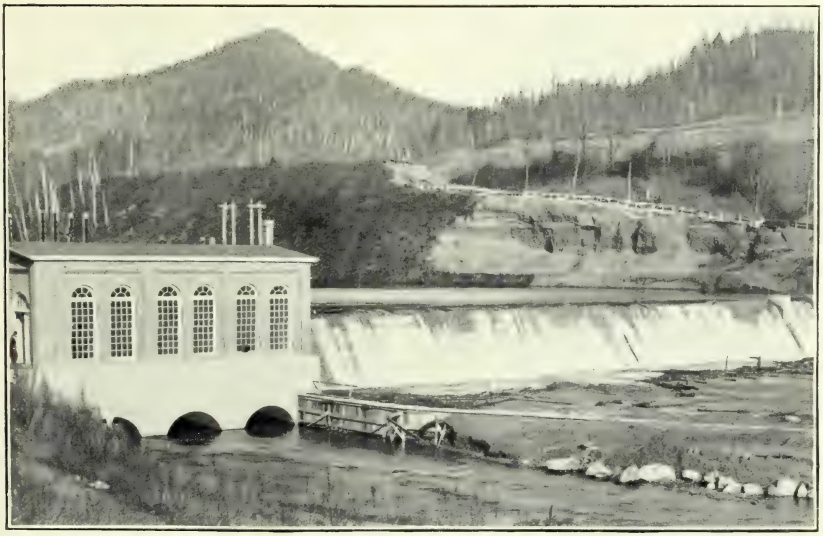
CONNECTICUT RIVER AT ORFORD, N. H.

This station, which is located at the wooden highway bridge between Orford, N. H., and Fairlee, Vt., was established August 6, 1900, to obtain general statistical and comparative data regarding the flow of Connecticut River. Several small streams enter the Connecticut near Orford, but the only one of any considerable size is Waits River, about 5 or 6 miles above the station. The nearest dam is at Wilder, about 18 miles downstream. Backwater effect at this dam reaches probably within a few miles of Orford. Upstream the nearest dam is at East Ryegate, Vt., about 20 miles distant.

The gage datum has remained the same during the maintenance of the station. During the winter months the discharge is usually affected by ice, but numerous discharge measurements under ice cover have been made, and a fairly good rating curve developed for these conditions. Conditions for obtaining accurate discharge data during the open season are good, and a fairly good rating curve has been developed for the period prior to 1907.

The monthly discharge for 1907–8 is, however, withheld pending the confirmation of recent measurements which indicate a change in the rating curve.

A. LOG JAM AT GAGING STATION ON SACANDAGA RIVER AT HADLEY, N. Y.



B. HYDRO-ELECTRIC POWER DEVELOPMENT ON WHITE RIVER NEAR SHARON, VT.

Discharge measurements of Connecticut River at Orford, N. H., 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.[a]	Gage height.[b]	Discharge.	Thickness of ice.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*	*Feet.*
February 20	Butterfield and Mention	288	1,080	4.51	4.9	1,100	1.72
February 21	do	288	1,050	4.64	4.97	1,090	1.64
September 27	D. M. Wood	284	1,990	5.87	.....	3,710	.....
1908.							
March 4 [c]	D. M. Wood	345	2,040	7.11	7.21	2,340	1.3
September 24	do	240	715	2.04	.....	439	.....
December 24 [d]	Wood and French	254	993	3.53	3.63	698	.7

[a] To water surface.
[b] To top of ice.
[c] Measurement made about 150 feet above the bridge.
[d] Measurement made at open channel section.

Daily gage height, in feet, of Connecticut River at Orford, N. H., for 1907–8.

[F. H. Gardner, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	.....	.....	17.5	23.8	7.6	8.8	7.0	3.4	11.4	12.0	6.1
2	.....	.....	.....	14.8	25.4	7.7	10.8	8.2	3.5	11.7	10.4	6.4
3	.....	5.4	5.5	13.9	26.1	7.1	10.5	8.3	3.5	11.2	11.0	7.0
4	.....	.....	.....	12.8	24.2	7.0	10.6	7.8	3.5	10.0	12.1	6.9
5	.....	.....	.....	12.2	21.4	7.2	9.8	7.3	4.3	9.4	11.9	6.8
6	[b] 7.9	.....	.....	12.8	18.6	7.3	9.2	7.0	6.7	9.5	12.7	[b] 6.1
7	.....	.....	.....	12.3	16.1	7.5	7.7	6.8	7.4	9.0	13.5	[b] 5.8
8	.....	.....	.....	12.0	15.3	7.4	7.0	6.5	6.4	8.5	14.4	.....
9	.....	.....	.....	10.8	13.4	7.2	6.9	6.1	5.9	11.8	13.8	[b] 6.0
10	.....	4.7	5.5	10.2	14.2	7.3	6.7	5.8	5.3	13.4	12.7	[b] 6.8
11	.....	.....	.....	10.1	14.5	6.7	6.7	5.4	5.8	13.0	11.4	17.2
12	.....	.....	.....	10.0	14.4	6.5	6.5	5.2	4.9	12.0	10.2	19.7
13	6.1	.....	.....	9.6	13.5	6.3	6.8	4.9	6.2	13.0	9.6	18.6
14	.....	.....	.....	9.8	12.0	6.3	7.0	4.6	7.2	13.0	9.0	16.1
15	.....	.....	.....	10.1	12.5	5.7	7.1	4.5	7.3	12.0	8.5	10.8
16	.....	.....	.....	10.1	12.6	5.3	7.7	4.3	5.8	10.7	8.0	9.5
17	.....	4.9	5.3	9.6	13.6	5.1	6.4	4.0	5.5	9.4	7.6	9.0
18	.....	.....	.....	10.0	14.7	5.0	5.7	3.6	5.0	8.5	7.4	8.5
19	.....	.....	.....	9.6	14.8	5.3	5.4	3.5	4.5	8.0	7.4	8.2
20	5.1	4.5	.....	9.3	13.1	5.7	5.0	3.3	5.1	8.6	7.2	8.8
21	.....	4.65	.....	9.1	11.9	10.0	4.9	3.3	4.4	7.3	7.0	9.1
22	.....	.....	.....	9.2	10.7	11.0	4.7	3.2	3.7	7.7	6.8	9.5
23	.....	.....	.....	9.8	9.7	9.9	4.8	3.2	3.7	6.8	6.9	9.7
24	.....	5.7	[b] 7.4	12.8	9.3	7.4	5.0	3.2	4.6	6.6	6.8	12.7
25	.....	.....	.....	18.9	8.3	6.8	5.2	3.1	5.4	6.4	6.8	15.5
26	.....	.....	.....	19.1	8.0	6.3	5.0	3.1	6.3	6.2	6.9	14.6
27	5.5	.....	.....	21.9	8.3	6.1	5.2	3.0	5.9	6.1	6.7	14.0
28	.....	.....	.....	22.1	8.1	6.0	5.5	3.0	5.5	6.3	6.4	12.1
29	.....	.....	.....	22.4	8.2	7.0	5.9	2.9	5.6	13.6	6.3	11.4
30	.....	.....	.....	22.5	8.0	7.8	6.7	3.3	9.0	15.9	6.0	11.0
31	.....	.....	19.95	.....	7.6	.....	6.9	3.4	.....	14.1	.....	10.9
1908.[c]												
1	10.8	.....	7.1	15.0	24.1	8.6	4.5	3.6	2.8	2.3	2.5	4.8
2	10.4	.....	.....	13.4	22.2	11.8	4.4	3.6	3.2	2.5	2.6	4.6
3	10.1	6.1	.....	11.9	18.7	10.0	4.4	3.6	2.9	2.7	2.7	4.5
4	[b] 10.2	.....	7.1	10.5	17.3	9.1	4.7	3.0	2.9	3.0	2.9	4.4
5	[b] 10.1	.....	.....	9.1	15.9	8.7	4.6	3.6	3.2	2.8	2.8	4.4
6	.....	.....	.....	9.2	14.2	7.7	4.4	3.6	3.0	3.3	2.5	3.2
7	.....	.....	.....	9.8	13.3	7.0	4.3	6.6	2.7	3.2	2.6	3.5
8	.....	.....	6.8	11.3	12.5	6.6	4.2	6.4	2.5	3.2	2.7	3.9
9	.....	6.7	.....	11.2	13.2	6.0	4.3	6.3	2.8	3.0	2.6	4.2
10	.....	.....	.....	10.8	14.3	5.7	4.2	5.5	2.3	2.7	2.7	3.9
11	.....	.....	.....	11.5	15.9	5.6	4.0	5.0	2.4	2.7	2.7	3.7
12	[b] 8.2	.....	.....	13.1	14.9	5.6	3.8	4.6	2.5	2.5	2.8	3.6
13	.....	.....	.....	12.7	13.8	5.5	3.4	4.3	2.6	2.7	3.3	3.7
14	.....	.....	.....	12.0	14.2	5.2	3.2	4.2	2.25	2.9	3.7	3.9
15	.....	.....	.....	11.5	14.4	5.0	3.5	4.1	2.3	3.1	3.7	3.9

[a] River frozen January 1 to March 31 and December 6 to 10, 1907. Gage heights during the frozen periods were taken to water surface in a hole cut in the ice.
[b] Gage height to top of ice.
[c] River frozen January 4 to March 27 and December 16 to 31, 1908. During the frozen period gage heights were taken to water surface in a hole cut in the ice.

Daily gage height, in feet, of Connecticut River at Orford, N. H., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	.....	[a] 18.0	[a] 11.2	11.7	13.2	7.9	3.7	4.0	2.5	3.2	3.7	4.0
17	.....	.....	.....	11.8	11.7	10.1	3.7	4.0	2.3	3.0	3.8	3.9
18	.....	.....	.....	11.4	10.3	12.2	3.8	4.1	2.4	2.9	3.7	3.7
19	7.5	.....	.....	11.0	10.0	10.0	3.9	4.3	2.4	2.6	2.8	3.7
20	.....	.....	.....	10.9	10.0	8.2	4.3	4.8	2.2	2.4	3.2	3.8
21	.....	.....	.....	10.7	9.8	7.0	5.1	4.8	1.9	2.4	3.1	.....
22	.....	.....	.....	10.8	9.1	6.0	5.0	4.6	2.4	2.5	3.0	3.7
23	.....	[a] 9.1	[a] 8.8	10.9	8.9	5.6	4.8	4.3	2.2	2.4	2.8	.....
24	.....	.....	.....	11.2	8.6	5.5	4.4	4.0	2.0	2.5	2.9	3.8
25	.....	.....	.....	11.9	8.2	5.0	4.2	3.6	2.3	2.5	3.1	.....
26	6.6	.....	.....	13.7	7.8	4.8	3.9	3.7	2.4	2.4	3.3	3.7
27	.....	.....	.....	16.7	8.0	4.6	3.6	3.6	2.1	2.6	3.8	.....
28	.....	.....	18.5	17.9	8.2	4.4	3.5	3.6	1.65	2.4	4.4	3.7
29	.....	.....	20.0	23.85	8.1	4.3	3.6	3.4	2.3	2.7	5.6	.....
30	.....	.....	21.9	24.7	8.6	4.1	3.7	3.0	2.4	2.7	4.9	3.8
31	.....	.....	17.2	.....	8.4	.....	3.6	3.0	.....	2.6	.....	.....

[a] Gage height to top of ice.

CONNECTICUT RIVER AT SUNDERLAND, MASS.

This station, which is located at a five-span steel highway bridge about 18 miles above the Holyoke dam and 5 miles below that at Turners Falls, was established March 31, 1904, to obtain general statistical and comparative data regarding the flow of the river.

A record of flow of the Connecticut at Holyoke was carried on from 1880 to 1899, but interrupted after that time, and as this station has practically the same drainage area, it is of especial value in continuing the Holyoke records, which have been very widely used in power, storage, and navigation studies both on the Connecticut and on streams of similar regimen. Deerfield River enters Connecticut a short distance below Turners Falls, about 4 miles above the station.

The gage datum has remained the same during the maintenance of the station. During the winter months the discharge is usually affected by ice. Conditions for obtaining accurate discharge data are fairly good, although there have been some changes in condition of the bed of the river, and a fairly good rating curve has been developed.

Discharge measurements of Connecticut River at Sunderland, Mass., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 6	R. A. Mention	812	9,260	12.23	30,800
April 25	Wood and Mention	816	10,700	14.65	44,400
September 25	D. M. Wood	719	4,110	5.55	9,820
1908.					
March 1 [a]	D. M. Wood	712	12,600	15.60	9,340
April 1	do	779	12,300	16.10	50,300
September 22	do	456	1,180	1.34	1,660
December 29 [b]	do	599	1,830	2.87	2,360

[a] Measurement made at Northampton highway bridge during ice jam above. Gage height to top of ice. Measurement poor.

[b] Ice measurement; gage height to top of ice 2.92 feet; average thickness of ice 0.25 foot.

Daily gage height, in feet, of Connecticut River at Sunderland, Mass., for 1907–8.

[V. Lawer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	.....	.....	17.9	16.4	6.6	6.65	4.4	1.9	10.1	13.25	5.9
2	.....	7.3	5.0	16.35	17.2	6.25	6.85	4.7	1.9	9.4	11.4	5.45
3	.....	.....	.....	14.0	17.55	7.15	7.1	5.2	1.95	8.75	15.8	5.25
4	8.8	.....	.....	12.4	17.5	8.7	7.45	5.55	2.1	8.4	16.5	5.2
5	15.2	.....	.....	11.65	17.4	8.1	7.6	5.5	3.25	9.45	15.45	5.1
6	14.7	.....	.....	12.05	16.1	8.9	7.2	5.4	4.45	8.3	13.7	5.3
7	14.05	.....	.....	11.65	14.1	8.85	6.5	5.2	4.6	7.8	21.55	5.35
8	14.65	.....	.....	10.85	12.75	8.1	5.8	5.0	5.35	7.8	21.85	5.30
9	12.9	6.5	5.05	10.25	12.0	7.4	5.1	4.7	4.95	10.2	17.7	5.35
10	11.1	.....	.....	9.8	11.1	6.9	4.8	4.5	4.55	10.7	14.65	5.6
11	11.8	.....	.....	9.35	10.8	6.7	4.7	4.15	4.3	10.3	13.0	14.4
12	11.05	.....	.....	9.05	10.75	6.3	4.85	3.85	4.25	10.3	11.6	16.9
13	11.4	.....	.....	9.05	10.6	6.0	6.1	3.6	4.4	10.8	10.45	15.9
14	11.2	.....	.....	9.2	10.05	5.6	5.9	3.2	4.3	10.2	9.7	13.55
15	10.5	.....	.....	9.85	9.2	5.05	5.35	3.1	4.55	9.65	9.0	11.5
16	10.0	6.05	6.9	10.45	8.85	4.75	5.2	3.15	4.65	8.9	8.3	10.05
17	.....	.....	7.45	10.2	11.0	4.55	5.2	3.0	4.5	8.2	7.9	9.25
18	.....	.....	8.95	9.85	13.05	4.4	5.1	2.8	4.1	7.45	7.4	8.65
19	9.2	.....	9.8	9.55	12.3	4.3	5.0	2.9	3.7	6.9	7.3	7.8
20	.....	.....	9.75	9.25	11.35	4.2	4.4	2.3	3.55	6.5	7.1	7.55
21	.....	.....	8.8	8.65	10.45	4.3	4.2	2.5	3.35	6.0	6.95	7.25
22	.....	.....	9.2	8.3	9.5	5.35	4.45	2.65	3.15	6.2	6.9	6.95
23	.....	5.35	10.7	8.2	8.7	6.9	4.1	2.7	3.25	5.9	6.95	7.05
24	.....	.....	16.5	9.4	8.0	6.6	4.0	2.6	5.2	5.7	6.8	9.1
25	.....	.....	13.95	14.5	7.45	6.0	5.05	2.0	5.65	5.5	6.6	12.7
26	8.1	.....	11.0	16.1	6.95	5.25	5.4	2.45	5.5	5.25	6.75	12.35
27	.....	.....	9.3	17.9	6.85	4.9	4.75	1.9	5.15	5.1	6.75	10.9
28	.....	.....	10.4	19.7	7.7	4.95	4.5	1.9	4.95	6.4	6.65	9.95
29	.....	.....	14.75	17.9	7.85	5.00	4.2	2.4	5.4	15.4	6.45	10.2
30	.....	.....	18.4	16.7	7.35	5.6	3.95	2.3	10.55	19.25	6.30	10.45
31	.....	.....	19.3	.....	6.9	.....	4.1	2.0	.....	16.25	.....	11.05
1908.[b]												
1	10.65	.....	15.6	16.05	18.65	10.05	3.05	2.4	2.4	1.5	1.75	2.95
2	9.55	.....	15.2	14.4	19.3	8.9	2.85	2.45	2.3	1.6	1.9	3.35
3	8.6	.....	15.3	12.9	17.45	8.7	2.85	2.45	2.1	1.6	1.65	3.0
4	7.9	.....	15.35	11.35	16.25	8.55	2.85	2.25	2.05	1.45	1.8	2.75
5	7.55	.....	15.4	9.95	15.1	7.8	2.95	2.35	1.95	1.7	1.85	2.4
6	7.25	.....	15.25	9.3	13.5	6.8	2.9	2.65	1.9	1.5	1.75	2.1
7	7.3	.....	14.85	9.95	12.1	6.15	3.2	3.55	1.9	1.45	1.75	2.45
8	8.0	6.9	14.6	10.85	14.2	5.5	3.05	3.9	1.7	1.9	1.15	2.65
9	8.7	.....	14.65	12.95	15.6	5.35	2.8	5.05	1.7	2.05	1.8	3.1
10	8.75	.....	14.9	13.6	15.4	4.9	2.75	5.1	1.9	1.95	1.6	3.1
11	8.35	.....	14.6	12.7	14.65	4.6	2.55	4.8	1.8	1.85	1.7	3.4
12	8.25	.....	14.7	13.0	13.85	4.45	2.45	4.35	1.75	1.9	1.85	4.1
13	8.6	.....	15.65	12.75	12.75	4.3	2.45	4.05	1.65	1.7	2.0	3.8
14	9.45	.....	17.0	11.95	12.0	4.2	2.2	4.15	1.65	1.8	2.0	4.2
15	9.05	7.5	20.15	11.0	13.1	3.9	2.2	3.9	1.5	1.75	1.55	3.7
16	8.55	23.5	23.65	11.05	12.95	4.1	2.7	3.65	1.45	1.7	1.75	3.65
17	8.15	30.6	25.05	11.1	11.6	5.1	2.25	3.45	1.6	1.55	1.8	3.6
18	7.95	28.5	23.05	10.85	10.45	7.4	2.05	3.45	1.55	1.3	2.1	3.6
19	7.65	24.75	21.2	10.95	9.6	7.7	1.85	4.05	1.65	1.7	2.3	3.5
20	7.6	22.3	19.8	11.8	8.9	7.05	2.25	3.6	1.55	1.7	2.2	3.1
21	7.45	20.0	18.35	11.3	8.5	6.1	2.25	3.45	1.6	1.5	2.15	3.25
22	7.25	19.15	17.45	10.2	8.55	5.3	2.45	3.45	1.55	1.7	1.6	3.0
23	7.5	18.4	17.3	9.4	10.0	4.85	3.8	3.45	1.5	1.65	2.2	3.15
24	9.0	17.45	19.0	9.7	9.1	4.4	3.8	3.45	1.45	1.6	1.7	3.05
25	10.05	16.95	20.35	10.1	8.0	4.1	3.65	3.25	1.35	1.1	1.8	2.9
26	9.75	16.2	14.3	10.95	7.4	3.95	5.15	3.1	1.35	1.65	2.25	3.05
27	9.7	16.3	15.25	12.65	7.15	3.7	4.3	2.95	1.0	1.6	2.35	2.55
28	9.9	16.7	17.5	14.2	7.0	3.55	3.35	2.85	1.55	1.8	2.2	2.95
29	9.8	16.45	18.8	16.2	6.5	3.15	3.55	2.7	1.65	2.0	1.7	2.9
30	9.2	.....	19.95	17.4	6.65	3.2	2.75	2.55	1.4	2.0	1.8	2.9
31	8.35	.....	18.15	.....	8.9	.....	2.45	2.45	.....	2.05	.....	2.9

[a] Ice conditions prevailed from about January 1 to March 20, 1907. During this period gage heights were taken to water surface in a hole in the ice except January 19 and 26 and March 16, when the readings were taken to the top of the ice.

[b] Ice conditions prevailed from about January 5 to March 25 and December 18 to 31, 1908. During these periods gage heights were taken to water surface in a hole in the ice except February 15 to March 23, when readings were taken to the top of the ice.

Rating table for Connecticut River at Sunderland, Mass., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.00	1,410	2.60	3,190	4.40	6,670	10.00	24,500
1.10	1,480	2.70	3,350	4.60	7,130	11.00	28,340
1.20	1,550	2.80	3,510	4.80	7,610	12.00	32,300
1.30	1,630	2.90	3,680	5.00	8,100	13.00	36,390
1.40	1,710	3.00	3,850	5.20	8,610	14.00	40,640
1.50	1,800	3.10	4,030	5.40	9,130	15.00	45,000
1.60	1,900	3.20	4,210	5.60	9,670	16.00	49,400
1.70	2,000	3.30	4,390	5.80	10,220	17.00	53,900
1.80	2,110	3.40	4,580	6.00	10,790	18.00	58,400
1.90	2,230	3.50	4,770	6.20	11,380	19.00	63,000
2.00	2,350	3.60	4,970	6.40	11,980	20.00	67,600
2.10	2,480	3.70	5,170	6.60	12,600	21.00	72,200
2.20	2,610	3.80	5,370	6.80	13,240	22.00	76,800
2.30	2,750	3.90	5,580	7.00	13,880		
2.40	2,890	4.00	5,790	8.00	17,250		
2.50	3,040	4.20	6,220	9.00	20,790		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1904–1908 and is well defined.

Monthly discharge of Connecticut River at Sunderland, Mass., for 1907–8.

[Drainage area, 7,700 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	.....	9,490	1.23	1.42	D.
February	.....	.....	4,690	.609	.63	D.
March	64,400	.....	16,600	2.16	2.49	C.
April	66,200	18,000	33,000	4.29	4.79	A.
May	56,400	13,400	30,000	3.90	4.50	A.
June	20,400	6,220	11,500	1.49	1.66	B.
July	15,900	5,680	9,200	1.19	1.37	B.
August	9,540	2,230	5.000	.649	.75	B.
September	26,600	2,230	6,910	.897	1.00	B.
October	64,200	8,350	21,300	2.77	3.19	A.
November	76,100	11,700	28,400	3.69	4.12	A.
December	53,400	8,350	21,500	2.79	3.22	A.
The year	76,100	2,230	16,500	2.14	29.14	
1908.						
January	27,000	.....	13,500	1.75	2.02	D.
February	.....	.....	15,200	1.97	2.12	C.
March	67,400	.....	24,700	3.21	3.70	C.
April	55,700	21,900	32,600	4.23	4.72	A.
May	64,400	12,300	32,200	4.18	4.82	A.
June	24,700	4,120	10,300	1.34	1.50	B.
July	8,480	2,170	3,770	.490	.56	B.
August	8,350	2,680	4,690	.609	.70	B.
September	2,890	1,410	2,010	.261	.29	B.
October	2,420	1,480	2,000	.260	.30	B.
November	2,820	1,520	2,210	.287	.32	B.
December	6,220	.....	3,710	.482	.56	B.
The year	67,400	1,410	12,200	1.59	21.61	

NOTE.—Discharge during the frozen periods determined by means of climatological conditions, coefficients for discharge under ice cover, and from February 1 to March 25, 1908, the discharge at Holyoke from data furnished by Mr. A. F. Sickman.

	Second-feet.
Discharge March 1 to 20, 1907	5,450
January 5 to 31, 1908	12,300
March 1 to 25, 1908	17,300
December 18 to 31, 1908	3,030

CONNECTICUT RIVER AT HARTFORD, CONN.

Daily readings of the height of water at Hartford have been recorded since February 8, 1896, by the Connecticut River bridge and highway district. Through the courtesy of John T. Henderson, deputy chief engineer, these have been furnished to the United States Geological Survey for 1907–8.

These heights are read on what is known as the tollhouse gage, the zero of which is set at the low-water mark of 1801. The highest water ever known in the river (29 feet 10 inches) was in May, 1854; the lowest (1½ inches below zero) in 1858, until 1908, when, on November 2 at 5 a. m., a height of 0.50 foot below zero was recorded.

This datum was used in the various surveys of the river below Hartford in 1866–67 [a]; also in the surveys above Hartford in 1871–1878 [b] and in the survey of 1897.[c] It has again been used, 1902–1905, in a further survey by the Secretary of War to study the problem of river improvements above Hartford.

During low-water periods the tidal wave comes up the river to Hartford. The visible effect of this wave is dependent on the height of the water and the direction and course of the wind.

During 1908 (records beginning September 8) an automatic recording gage of the Friez type was installed by the United States Weather Bureau in one of the piers of the new stone arch bridge, this being set to record gage heights to the same datum as the tollhouse gage.[d]

From figures given in the Report of the Chief of Engineers for 1878, pages 348–391, and from other data, computations of the discharge of Connecticut River at Hartford from 1871 to 1886, inclusive, were prepared and published in the Fourteenth Annual Report of the Geological Survey, Part II, pages 141–144.

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[a] See report of Theodore G. Ellis, 1867 (H. R. Ex. Doc. No. 153, 40th Cong., 2d sess).

[b] Engineer's Report 1878, pp. 348–391.

[c] Engineer's Report 1898, pp. 976–988.

[d] See Monthly Weather Review, October, 1908, pp. 340–342

Daily gage height, in feet, of Connecticut River at Hartford, Conn., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.4	4.7	3.1	16.6	14.4	5.6	3.7	2.7	1.5	8.9	15.5	5.5
2	7.9	4.8	3.2	15.8	14.0	5.3	4.8	2.8	2.0	8.0	12.5	5.4
3	7.5	3.9	2.5	14.4	14.5	6.0	4.8	2.7	2.3	7.2	11.9	4.9
4	7.0	3.8	2.4	12.3	14.9	7.3	4.4	2.4	2.7	6.9	16.0	4.3
5	7.5	4.9	3.8	10.8	14.8	7.6	4.7	2.7	2.7	7.0	16.0	3.7
6	7.3	4.6	3.7	10.0	14.9	7.8	5.1	3.0	2.0	7.2	14.6	4.5
7	7.0	4.1	3.5	10.0	13.8	8.2	4.8	3.0	2.4	6.6	16.7	3.8
8	6.8	4.1	3.5	10.0	12.1	7.6	4.2	2.6	2.6	6.9	20.7	3.9
9	7.7	4.5	3.5	9.6	10.9	6.6	3.7	2.7	2.5	8.5	20.6	3.7
10	7.0	4.0	3.0	9.2	10.0	6.0	3.0	2.2	2.7	9.5	18.1	4.6
11	6.1	3.8	2.4	8.7	9.3	5.6	2.8	2.4	2.4	9.1	15.6	9.2
12	5.9	4.2	3.6	8.6	8.9	5.5	3.0	2.1	2.6	8.7	13.1	13.9
13	4.8	3.7	3.5	8.2	8.8	5.0	3.0	2.0	2.3	8.5	11.2	14.8
14	4.5	3.8	3.5	8.1	8.7	4.5	3.7	2.0	2.5	8.6	9.8	13.8
15	4.5	4.1	4.1	8.2	7.9	4.4	3.7	1.6	2.0	7.9	8.7	12.1
16	3.3	4.0	5.2	8.7	7.2	3.7	3.3	1.7	2.4	7.4	8.0	10.0
17	4.4	3.9	6.4	9.1	8.0	3.4	3.3	2.2	2.8	6.7	7.1	8.8
18	5.6	3.0	8.3	8.7	10.7	3.3	3.2	1.8	2.9	6.2	6.9	7.7
19	6.0	4.7	9.3	8.2	11.2	3.0	3.1	1.8	3.4	5.5	6.6	7.2
20	5.4	3.9	8.6	8.0	10.6	3.2	3.2	2.6	3.1	4.9	6.5	6.3
21	7.0	3.7	7.5	7.5	9.6	2.9	2.6	2.6	2.8	4.6	6.4	5.8
22	7.0	3.0	6.9	6.8	8.5	2.7	2.9	2.2	1.9	4.6	6.1	5.5
23	6.2	2.8	6.1	6.6	7.6	3.0	3.0	2.0	1.8	4.5	6.0	5.4
24	5.5	2.5	8.3	7.0	6.9	4.5	2.8	1.8	5.0	4.2	5.8	8.2
25	5.2	2.1	10.8	9.3	6.2	4.5	3.0	1.8	6.5	4.1	6.8	10.8
26	5.2	3.1	10.3	12.8	5.5	4.2	2.8	.8	5.2	3.8	6.4	12.3
27	4.6	3.4	9.1	13.4	5.6	3.6	2.9	1.6	4.2	3.4	6.3	11.3
28	4.8	3.0	8.6	15.5	6.0	3.3	2.3	1.6	3.7	4.6	6.0	9.8
29	5.1	.....	10.7	16.3	6.6	3.5	2.7	1.6	4.1	10.6	5.8	9.2
30	5.0	.....	14.0	15.4	6.3	4.0	3.0	1.6	7.1	17.0	5.7	9.8
31	4.7	.....	15.9	.....	6.0	.....	2.8	1.6	.....	17.7	.....	10.8
1908.												
1	11.0	6.1	5.4	16.9	15.2	9.2	2.8	1.9	1.4	1.3	.6	2.0
2	10.2	7.3	5.7	15.0	16.6	9.0	2.4	1.6	2.0	1.1	.5	1.2
3	8.9	6.4	5.8	13.4	16.7	7.5	2.1	1.0	2.2	.8	1.8	1.6
4	7.6	6.0	5.0	11.4	15.6	7.1	2.4	1.6	1.9	1.4	2.9	2.7
5	6.4	5.7	5.0	10.0	14.5	6.5	2.3	2.2	2.0	1.8	2.3	2.5
6	5.4	5.8	4.8	9.0	12.6	6.5	2.3	2.0	1.4	2.4	2.2	1.7
7	6.5	5.6	5.0	8.7	11.6	5.2	2.2	2.9	1.6	2.6	2.0	3.5
8	8.4	5.8	4.5	9.0	12.0	4.9	2.3	2.8	1.6	2.4	2.4	1.8
9	7.9	5.1	4.8	10.3	14.3	4.5	2.4	2.6	2.0	2.4	1.5	1.1
10	7.0	4.8	4.2	12.3	14.5	4.1	2.2	3.3	2.2	1.5	1.4	.6
11	6.7	5.0	4.2	12.3	14.0	3.8	2.6	2.6	1.0	1.6	1.3	1.2
12	6.5	5.0	4.8	11.2	13.2	3.5	2.0	3.0	.9	.3	.3	1.8
13	9.0	4.8	5.5	11.3	12.0	3.3	2.2	2.7	.9	.8	.1	1.1
14	9.6	4.9	6.5	10.9	10.8	3.2	2.4	2.5	.9	1.1	1.2	1.0
15	8.4	5.6	8.0	10.4	10.5	3.5	1.8	2.3	1.0	.9	1.7	1.5
16	7.3	14.5	10.4	9.3	11.3	3.6	2.2	2.0	1.5	1.1	1.0	1.4
17	6.1	17.0	12.1	9.4	10.6	2.7	2.0	2.2	1.5	1.6	1.8	1.7
18	5.8	18.3	12.2	9.5	9.8	2.7	2.4	2.5	2.1	1.6	1.7	2.1
19	5.4	16.0	11.4	9.0	8.9	4.2	2.0	2.5	1.9	1.7	1.6	1.9
20	5.3	12.7	10.7	9.6	8.5	5.1	1.3	2.2	2.0	3.1	1.4	2.3
21	5.0	10.0	9.4	10.2	7.3	3.4	1.8	2.3	1.9	2.6	1.3	2.1
22	5.0	8.5	8.0	9.5	7.2	4.3	2.0	2.5	2.0	2.3	1.9	1.9
23	4.8	7.0	7.5	8.7	8.7	4.0	1.9	2.0	1.8	2.2	1.6	2.4
24	4.9	6.8	8.2	7.7	9.1	3.8	2.0	2.5	1.9	2.1	1.6	1.9
25	4.5	6.8	10.9	8.2	7.9	4.1	3.0	2.7	1.5	1.7	1.6	2.0
26	5.3	6.8	14.1	7.8	7.0	3.5	2.0	3.0	1.0	2.0	1.2	1.4
27	7.3	7.3	13.7	9.0	6.2	3.3	3.0	3.2	.6	2.1	.1	1.0
28	6.2	6.8	14.5	10.6	5.6	2.4	3.5	3.4	.4	1.6	.4	.6
29	6.5	6.0	16.5	11.8	5.3	2.3	2.2	3.0	1.5	1.0	.8	1.4
30	5.2	.....	18.1	13.5	5.0	2.8	1.9	2.8	.3	1.7	.7	1.8
31	7.4	.....	18.1	.....	7.0	.....	1.5	.8	.....	1.4	.....	2.1

ISRAEL RIVER (BELOW SOUTH BRANCH) NEAR JEFFERSON HIGHLANDS, N. H.

This station which was established September 2, 1903, in cooperation with the New Hampshire Forestry Commission, was taken over by the United States Geological Survey in 1904 and was discontinued May 1, 1907. It was located at a small wooden highway bridge about 2 miles from the railway station at Jefferson Highlands, N. H., in the town of Jefferson.

It was about one-fourth mile below the confluence of the South Branch, which drains an area of about 10.5 square miles. The headwaters of Israel River reach an elevation of 5,000 feet, in the Presidential Range, there is no storage, and most of the area is in forest. The underlying rock is granite, exposed in the mountain tops.

During the winter months the discharge was so affected by ice that records could not be obtained. Conditions for obtaining accurate discharge data during the rest of the year are fairly good. A good rating curve has been developed, and since and including 1906 the results at this station are satisfactory. Prior to that time they are probably not as good, owing to carelessness of the observer.

The gage datum remained the same during the maintenance of the station.

Daily gage height, in feet, of Israel River (below South Branch) near Jefferson Highlands, N. H., for 1907.

[William Russell, observer.]

Day.	Mar.	Apr.	Day.	Mar.	Apr.	Day.	Mar.	Apr.
1	.....	1.9	11	.....	1.5	21	1.05	1.7
2	.....	1.9	12	.....	1.5	22	1.05	1.9
3	.....	1.7	13	.....	1.5	23	1.5	2.1
4	.....	1.7	14	.....	1.6	24	1.9	2.5
5	.....	1.75	15	.....	1.6	25	1.25	2.4
6	.....	1.7	16	.....	1.6	26	1.2	2.35
7	.....	1.6	17	.....	1.8	27	1.2	2.2
8	.....	1.7	18	.....	1.9	28	1.6	2.4
9	.....	1.7	19	1.1	1.8	29	4.15	1.9
10	.....	1.6	20	1.05	1.8	30	4.75	1.9
						31	2.3	.....

NOTE.—River probably frozen from January 1 to March 18.

Rating table for Israel River (below South Branch) near Jefferson Highlands, N. H., for 1905–1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.00	10	1.90	128	2.80	385	3.70	655
1.10	15	2.00	154	2.90	414	3.80	686
1.20	21	2.10	182	3.00	443	3.90	717
1.30	29	2.20	211	3.10	473	4.00	748
1.40	39	2.30	240	3.20	503	4.20	812
1.50	51	2.40	269	3.30	533	4.40	876
1.60	66	2.50	298	3.40	563	4.60	941
1.70	84	2.60	327	3.50	593	4.80	1,007
1.80	105	2.70	356	3.60	624		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903–1906 and is well defined between gage heights 0.9 foot and 2.6 feet.

Monthly discharge of Israel River (below South Branch) near Jefferson Highlands, N. H., for 1907.

[Drainage area, 21.2 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March 19 to 31	990	12	184	8.68	4.20	C.
April	298	51	122	5.75	6.42	B.

AMMONOOSUC RIVER AT BRETTON WOODS, N. H.

The headwaters of Ammonoosuc River are on the westerly slopes of Mount Washington and Mount Jefferson, and, except at these higher altitudes, the basin is forested. The slopes are generally steep, and no storage is available.

The gaging station, which was established August 28, 1903, in cooperation with the New Hampshire Forestry Commission, was taken over by the United States Geological Survey in 1904 and maintained until May 1, 1907. It is located at the steel highway bridge near the Mount Pleasant House at Bretton Woods.

The station site is about 1½ miles above the confluence of Cherry Mountain Brook and about 3½ miles above that of Zealand River.

During the winter months the discharge is so affected by ice that records could not be obtained. Conditions for obtaining accurate discharge data during the rest of the year are rather poor, owing to the shifting character of the river bed.

The gage datum remained the same during the maintenance of the tation.

Daily gage height, in feet, of Ammonoosuc River at Bretton Woods, N. H., for 1907.

[John Paige, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1	1.78	1.52	.....	2.45	16	.....	1.65	.....	1.90
2	1.82	1.58	.....	2.22	17	.....	.....	.....	1.88
3	1.72	1.65	.....	2.12	18	.....	.....	.....	1.80
4	1.85	1.70	.....	2.10	19	2.05	.....	.....	1.90
5	2.0	1.65	.....	2.22	20	2.20	.....	.....	1.85
6	1.98	1.65	.....	2.28	21	.....	.....	.....	1.80
7	1.88	.....	.....	2.15	22	.....	.....	.....	1.82
8	1.82	1.60	.....	2.10	23	.....	.....	.....	2.25
9	1.80	1.55	.....	2.00	24	.....	.....	.....	3.30
10	.....	1.55	.....	1.90	25	1.80	.....	1.70	2.72
11	.....	1.55	.....	1.90	26	1.60	.....	1.60	2.95
12	1.70	1.55	.....	1.90	27	.....	.....	1.62	3.32
13	.....	1.55	.....	1.92	28	.....	.....	2.15	3.20
14	.....	1.60	.....	1.90	29	.....	.....	3.22	3.92
15	1.55	1.62	.....	1.82	30	.....	.....	3.55	4.45
					31	1.50	.....	2.88	.....

NOTE.—River frozen over from about January 10 to March 24. During the frozen period gage heights were taken to water surface in a hole in the ice.

Rating table for Ammonoosuc River at Bretton Woods, N. H., for 1906–7.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	27	2.40	138	3.20	388	4.00	726
1.70	36	2.50	160	3.30	428	4.10	770
1.80	46	2.60	185	3.40	469	4.20	815
1.90	57	2.70	213	3.50	510	4.30	860
2.00	70	2.80	243	3.60	552	4.40	905
2.10	84	2.90	275	3.70	595	4.50	950
2.20	100	3.00	310	3.80	638		
2.30	118	3.10	348	3.90	682		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1906 and is not well defined.

Monthly discharge of Ammonoosuc River at Bretton Woods, N. H., for 1907.

[Drainage area, 34 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January 1–9	70	38	52.0	1.53	0.51	D
March 25–31	531	27	197	5.79	1.51	C
April	928	46	169	4.97	5.54	C

ZEALAND RIVER NEAR TWIN MOUNTAIN, N. H.

The headwaters of Zealand River lie in a spur of the White Mountains at an elevation of about 3,000 feet. Slopes are steep, there is no storage, and the basin was deforested about fifteen years ago. It is now mostly covered with poplar and cherry, affording a thick cover in summer but little in winter.

The gaging station, which was established August 29, 1903, in cooperation with the New Hampshire Forestry Commission, was taken up by the United States Geological Survey in 1904 and discontinued May 1, 1907. It was located about 800 feet above the confluence of the river with the Ammonoosuc, at a point about midway between Fabyans and Twin Mountain.

Ice prevented records during the winter months. Conditions for obtaining accurate discharge data during the rest of the year have been rather poor owing to occasional settlement of the gage.

The gage datum has remained the same during the maintenance of the gage.

Daily gage height, in feet, of Zealand River near Twin Mountain, N. H., for 1907.

[Charles Cote, observer.]

Day.	Apr.	Day.	Apr.	Day.	Apr.
1	3.0	11	2.8	21	3.0
2	2.9	12	2.75	22	2.95
3	3.0	13	2.7	23	2.9
4	2.9	14	2.6	24	2.8
5	2.9	15	2.6	25	4.4
6	2.85	16	2.6	26	4.2
7	2.8	17	2.6	27	4.05
8	2.75	18	4.8	28	4.0
9	2.7	19	2.8	29	4.6
10	2.8	20	2.9	30	4.8

NOTE.—River probably frozen from January 1 to about March 31.

Rating table for Zealand River near Twin Mountain, N. H., for 1906–7.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.60	60	3.20	222	3.80	445	4.40	696
2.70	78	3.30	257	3.90	485	4.50	740
2.80	100	3.40	293	4.00	526	4.60	785
2.90	127	3.50	330	4.10	567	4.70	831
3.00	156	3.60	368	4.20	609	4.80	878
3.10	188	3.70	406	4.30	652		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 4 discharge measurements made during 1906 and is merged with the 1905 curve at gage height 2.6 feet. It is fairly well defined.

Monthly discharge of Zealand River near Twin Mountain, N. H., for 1907.

[Drainage area, 14 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
April	878	60	245	17.5	19.52

NOTE.—Accuracy of the above values very doubtful, owing to settlement of gage and owing to the fact that the rate of run-off per square mile is much greater than that at either of the two preceding stations.

ASHUELOT RIVER AT HINSDALE, N. H.

Ashuelot River is a rather important stream for power, rising in the town of Washington, Sullivan County, N. H., and running in a general southwesterly direction about 4.5 miles to Connecticut River near Hinsdale. Its drainage basin, comprising approximately 442 square miles, includes Mount Monadnock and is to a considerable extent forested. Water is stored for power at several ponds and reservoirs in the basin.

The gaging station is located at the lower highway bridge in the town of Hinsdale, about one fourth mile below the dam used jointly

by the Fiske Paper Company and the Haile & Frost Manufacturing Company, and was established February 22, 1907, in cooperation with Charles Bigelow, treasurer of the Haile & Frost Manufacturing Company, to obtain general statistical and comparative data regarding the flow of the Ashuelot. It is about 2 miles above the mouth of the river, but as there is considerable fall below there is no backwater influence except possibly at very high stages of the Connecticut. The use of water at the dam at Hinsdale causes some daily fluctuations in stage during low-water season.

The gage datum has remained the same during the maintenance of the station. During the winter discharge is affected by ice. Conditions for obtaining accurate discharge data are good, and a fairly good rating curve has been developed.

Discharge measurements of Ashuelot River at Hinsdale, N. H., in 1906–1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1906.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 31	F. E. Pressey	120	185	3.24	230
1907.					
February 22 [a]	Butterfield and Mention	134	156	3.70	165
April 5	R. A. Mention	134	442	4.74	1,780
September 26	D. M. Wood	128	285	3.94	680
1908.					
March 3	D. M. Wood	125	274	3.93	553
March 30	do	142	610	6.25	3,380
March 31	do	142	600	6.08	3,080
September 23	do	111	154	2.90	158
December 23 [b]	Wood and French			3.48	127

[a] Measurement made under ice conditions. Right channel open about 2 feet at station 130 and whole channel filled with piled up ice. Left channel all frozen. Poor winter conditions.
[b] Partial ice conditions, Left channel open; right channel filled with piled up ice. Water flowing slightly over ice in places.

Daily gage height, in feet, of Ashuelot River at Hinsdale, N. H., for 1907–8.

[Dyson Raine, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1				5.95	4.45	3.80	3.55	3.28	2.95	5.42	5.45	3.88
2				5.45	4.35	3.70	3.72	3.20	2.72	4.78	4.98	3.90
3				4.95	4.30	4.18	3.55	3.20	3.00	4.25	5.58	3.88
4				4.80	4.25	4.78	3.42	3.15	3.00	4.12	6.20	3.80
5				4.75	4.42	4.65	3.15	3.28	3.32	4.42	5.78	3.78
6				4.78	4.35	4.85	3.30	3.25	3.32	4.25	5.28	3.72
7				4.60	4.30	4.92	3.20	3.35	3.38	4.08	6.30	3.55
8				4.42	4.18	4.65	3.22	3.28	3.12	4.15	6.88	3.58
9				4.38	4.10	4.32	3.15	3.20	3.10	4.80	6.42	3.62
10				4.35	4.02	4.15	3.20	3.18	3.18	4.70	5.60	3.90
11				4.32	3.95	4.08	3.08	2.78	3.18	4.45	5.30	5.80
12				4.38	3.95	3.92	3.52	3.18	3.68	4.32	5.00	6.38
13				4.52	3.88	3.78	4.05	3.18	3.70	4.25	4.78	5.68
14				4.50	3.82	3.72	3.80	3.12	3.52	4.18	4.65	4.95
15				4.68	3.72	3.65	3.48	3.10	3.22	4.10	4.52	4.40

[a] Discharge probably not affected by ice conditions during March and December, 1907.

Daily gage height, in feet, of Ashuelot River at Hinsdale, N. H., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	.....	.....	.....	4.80	3.72	3.55	3.25	3.00	3.25	4.00	4.38	4.50
17	.....	.....	4.19	4.78	4.35	3.50	3.40	2.75	3.20	3.88	4.20	4.48
18	.....	.....	4.30	4.72	4.88	3.50	3.70	2.62	3.18	3.82	4.15	4.35
19	.....	.....	4.55	4.58	4.58	3.35	3.60	2.78	3.15	3.75	4.12	4.25
20	.....	.....	4.32	4.48	4.25	3.42	3.48	3.02	3.10	3.62	4.10	4.00
21	.....	.....	4.15	4.32	4.12	3.18	3.38	3.10	3.05	3.75	4.08	4.08
22	.....	.....	4.15	4.22	3.95	3.35	3.62	3.05	2.90	3.72	4.12	3.95
23	.....	.....	4.38	4.22	3.80	3.08	3.50	3.00	2.98	3.70	4.15	4.18
24	.....	.....	5.05	4.52	3.72	3.35	3.42	2.92	4.15	3.68	4.00	5.28
25	.....	.....	5.08	5.28	3.72	3.18	3.58	3.00	4.28	3.62	4.10	5.62
26	.....	.....	4.85	5.28	3.60	3.25	3.72	2.68	4.02	3.58	4.12	5.35
27	.....	.....	4.82	5.00	3.72	3.55	3.65	2.92	3.75	3.32	4.10	4.85
28	.....	.....	5.18	4.88	4.12	3.72	3.30	2.90	3.58	3.92	4.05	4.75
29	.....	.....	5.68	4.72	4.10	3.48	3.30	2.92	4.10	5.35	4.02	4.70
30	.....	.....	6.10	4.55	3.92	3.50	3.32	2.82	5.50	6.28	3.98	4.70
31	.....	.....	6.22	.....	3.78	.....	3.30	2.92	.....	6.22	.....	4.95
1908.[a]												
1	4.82	4.22	3.78	5.50	5.00	4.58	3.02	3.08	2.92	2.52	2.78	2.92
2	4.62	4.88	3.78	5.10	5.00	4.40	3.02	3.08	2.95	2.65	2.32	2.78
3	4.52	5.32	3.88	4.88	5.02	4.05	3.08	2.65	3.10	2.75	2.85	2.90
4	4.18	5.58	3.92	4.72	5.12	3.85	2.92	3.10	2.85	2.58	2.62	2.35
5	4.12	5.68	3.88	4.45	4.90	3.75	2.92	2.98	2.78	2.30	2.60	2.62
6	4.18	5.78	3.88	4.45	4.72	3.62	3.05	3.25	2.40	2.70	2.75	.....
7	4.48	5.88	3.68	4.58	4.52	3.45	3.15	3.65	2.95	2.40	2.62	.....
8	4.48	6.02	3.72	4.62	5.08	3.45	3.05	3.58	2.92	2.85	2.50	.....
9	4.58	.....	3.72	4.98	5.55	3.50	2.92	3.38	2.58	2.68	2.55	.....
10	4.42	.....	3.72	5.12	5.65	3.40	2.52	3.32	2.98	2.75	2.45	.....
11	4.32	.....	3.70	4.98	5.22	3.32	2.90	3.25	2.92	2.55	2.62	.....
12	4.32	.....	3.80	4.90	4.88	3.28	2.82	3.18	2.78	2.62	2.72	.....
13	4.68	.....	4.15	4.80	4.65	3.22	2.80	3.15	2.55	2.35	2.42	.....
14	4.88	.....	4.70	4.68	4.55	2.95	2.78	3.40	2.78	2.48	2.70	.....
15	4.58	.....	5.35	4.55	4.78	3.12	2.75	3.25	2.60	2.75	2.50	.....
16	4.38	6.68	5.75	4.60	4.75	3.25	2.50	3.15	2.55	2.68	2.48	.....
17	4.22	6.38	5.60	4.58	4.52	3.22	2.62	2.85	2.45	2.75	2.72	.....
18	4.12	5.62	5.10	4.45	4.38	3.20	2.60	3.30	2.70	2.52	2.68	.....
19	3.98	4.68	4.70	4.52	4.18	3.10	2.62	3.22	2.78	2.22	2.55	.....
20	4.02	4.28	4.45	4.82	4.08	3.05	2.70	3.22	2.85	2.40	2.52	.....
21	4.02	4.22	4.30	4.72	4.00	2.72	2.98	3.12	2.48	2.55	2.68	.....
22	3.92	4.18	4.25	4.55	4.02	3.08	3.00	3.05	2.50	2.59	2.40	.....
23	3.82	3.98	4.35	4.38	4.05	3.02	3.05	2.88	2.58	2.38	2.52	3.48
24	3.88	3.88	4.85	4.35	3.95	3.15	3.05	2.98	2.80	2.35	2.48	.....
25	3.82	3.82	5.65	4.35	3.92	3.10	3.20	3.10	2.70	2.38	2.75	.....
26	3.88	3.78	5.40	4.40	3.85	3.10	3.72	3.00	2.30	2.25	2.55	2.82
27	4.08	3.88	5.50	4.55	3.80	3.08	3.48	3.18	2.72	2.75	2.82	.....
28	4.52	3.92	5.75	4.55	3.82	2.90	3.32	3.12	2.62	2.72	2.65	2.72
29	4.18	3.82	5.90	4.78	3.72	3.05	3.15	3.12	2.72	2.68	2.48	2.91
30	4.22	.....	6.20	5.00	3.60	2.88	3.00	2.88	2.68	2.72	2.62	3.00
31	4.12	.....	6.00	.....	4.18	.....	3.02	2.98	.....	2.90	.....	2.85

[a] January 1 to 26 discharge probably only slightly affected by ice conditions. Ice conditions January 27 to February 15 and December 6 to 31, 1908.

Rating table for Ashuelot River at Hinsdale, N. H., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.20	46	3.50	355	4.80	1,400	6.10	3,120
2.30	53	3.60	405	4.90	1,510	6.20	3,280
2.40	62	3.70	460	5.00	1,620	6.30	3,440
2.50	73	3.80	520	5.10	1,740	6.40	3,600
2.60	86	3.90	585	5.20	1,860	6.50	3,770
2.70	102	4.00	660	5.30	1,990	6.60	3,940
2.80	121	4.10	735	5.40	2,120	6.70	4,120
2.90	144	4.20	815	5.50	2,250	6.80	4,300
3.00	170	4.30	900	5.60	2,390	6.90	4,480
3.10	200	4.40	990	5.70	2,530	7.00	4,670
3.20	233	4.50	1,090	5.80	2,670		
3.30	270	4.60	1,190	5.90	2,820		
3.40	311	4.70	1,290	6.00	2,970		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions It is based on 6 discharge measurements made during 1906–1908, and is well defined above gage height 2.8 feet.

Monthly discharge of Ashuelot River at Hinsdale, N. H., for 1907–8.

[Drainage area, 440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
March 17–31	3,310	775	1,560	3.55	1.98	A.
April	2,900	832	1,320	3.00	3.35	B.
May	1,490	405	738	1.68	1.94	B.
June	1,560	194	594	1.35	1.51	C.
July	698	194	343	.780	.90	C.
August	290	89	187	.425	.49	C.
September	2,250	112	389	.884	.99	C.
October	3,410	278	986	2.24	2.58	B.
November	4,440	645	1,550	3.52	3.93	A.
December	3,570	380	1,170	2.66	3.07	B.
1908.						
January	1,490	.....	840	1.91	2.20	C.
February	4,080	.....	821	1.87	2.02	C.
March	3,280	449	1,360	3.09	3.56	B.
April	2,250	945	1,300	2.95	3.29	B.
May	2,460	405	1,150	2.61	3.01	B.
June	1,170	106	322	.732	.82	C.
July	472	73	171	.389	.45	C.
August	432	94	222	.505	.58	C.
September	200	53	111	.252	.28	C.
October	144	47	86.7	.197	.23	C.
November	132	55	88.1	.200	.22	C.
December	.....	.....	132	.300	.35	D.
The year	4,080	47	550	1.25	17.01	

NOTE.—Discharge during the frozen periods, 1908, based on climatological reports and one measurement made under ice conditions.

	Sec.-ft.
Discharge January 27 to 31, 1908	500
February 1 to 15, 1908	400
December 6 to 31, 1908	136

MILLERS RIVER NEAR FARLEY STATION, MASS.

During October, 1908, a series of measurements of discharge of Millers River were made at the plant of the Farley Paper Company, Farley Depot, Mass., by Fowler & Toquet, of Springfield, Mass., who supplied the following data:

The discharge was measured by using the head gates of the canal as submerged orifices. The canal gates are of wood, 4 inches thick, and the sills, guides, etc., are of 10-inch stock with all edges squared. The head, acting to cause discharge was small, averaging only about 0.15 to 0.25 of a foot during the time of measurements, and the results are probably subject to some error.

Gage readings were taken every half hour for a period of a week, beginning October 23, with the following results:

Mean discharge of Millers River for twenty-four hours.

	Sec.-ft.
October 23	88.2
24	69.4
25 (Sunday)	30.8
26	65.9
27	73.0
28	87.4
29	97.2
Mean for week, October 23–29	73.1

Drainage area at this point is about 380 square miles.

WARE RIVER NEAR WARE, MASS.

Ware River is formed in the town of Barre, by the union of several small streams. The surrounding country is hilly and largely cleared. The total drainage area comprises about 162 square miles and is tributary to Chicopee River, which drains a large section of central Massachusetts and is the largest tributary of the Connecticut in respect to drainage area, its basin containing 730 square miles. Chicopee River is formed at Three Rivers, by the union in that vicinity of Ware, Swift, and Quaboag rivers; thence runs westward about 15 miles, joining the Connecticut at Chicopee. Chicopee River and its tributaries are quite important water-power streams, and expensive developments have been made on them.

The gaging station, which is located at the steel highway bridge about 2 miles above the village of Ware, was established September 15, 1904, in cooperation with the Otis Company and George H. Gilbert Manufacturing Company of Ware, to obtain general information regarding the flow of the river.

The nearest dam downstream is that of the Otis Company at Ware, and at times there is probably backwater effect from this dam. Upstream the nearest dam is at Gilbertville, a little over a mile.

The gage datum has remained the same during the maintenance of the station. During the winter months the discharge is usually affected for short periods by ice. Conditions for making discharge measurements are good, but the measurements do not plot well on the rating curve, either because of occasional backwater influence from the dam at Ware or changes in condition of the channel due to growth of grass and weeds during the summer.

Computations of monthly discharge are withheld pending the collection of more information regarding the conditions of flow at this point.

Discharge measurements of Ware River near Ware, Mass., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 26	Wood and Mention	83.4	179	3.43	489
May 18	D. M. Wood	83.4	167	3.35	408
September 24[a]	do	83.4	343	5.55	1,150
1908.					
March 2	D. M. Wood	83.4	151	3.38	243
April 25	do	83.4	134	3.14	310
September 26	Wood and French	71.0	83.6	2.56	96.9

[a] Poor measurement; meter interfered with by floating grass.

Daily gage height, in feet, of Ware River near Ware, Mass., for 1907–8.

[M. N. Richards and Arthur Bousquet, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	5.9	.....	.....	4.1	3.05	2.8	2.55	2.8	2.2	3.75	4.0	3.3
2	4.75	.....	.....	3.9	2.9	2.4	2.6	2.65	2.0	3.4	3.65	3.3
3	4.3	.....	.....	3.6	2.9	3.1	2.75	2.4	2.1	3.35	5.05	3.35
4	4.6	.....	.....	3.6	3.0	3.05	2.55	2.5	2.2	3.35	5.4	3.3
5	4.2	.....	.....	3.5	2.7	3.2	2.85	2.3	2.9	3.6	5.15	3.35
6	4.1	5.5	.....	3.1	2.7	3.2	2.55	2.3	2.6	3.0	4.5	3.3
7	3.9	.....	.....	3.0	2.9	3.15	2.2	2.5	2.45	3.3	6.7	2.65
8	3.7	.....	.....	2.95	3.1	3.15	2.3	2.6	1.9	5.05	6.5	3.1
9	3.85	.....	.....	3.6	2.75	2.7	2.5	2.5	2.1	5.2	5.8	3.5
10	3.55	.....	3.35	3.5	2.9	3.0	2.6	2.15	2.6	4.65	5.2	3.65
11	3.6	.....	3.55	3.5	2.7	2.8	2.55	2.05	2.85	4.2	5.25	4.45
12	3.4	.....	3.3	3.6	3.0	2.8	2.8	1.9	2.7	3.95	4.8	4.85
13	3.2	5.7	3.1	3.7	3.1	2.7	2.55	1.95	2.6	3.7	4.4	4.7
14	3.4	.....	3.3	3.45	3.05	2.6	2.55	1.85	2.1	3.6	4.1	4.6
15	3.25	.....	3.6	3.8	3.0	2.5	2.5	1.95	1.8	3.75	3.6	4.15
16	3.05	.....	3.7	3.8	2.95	2.55	2.8	1.85	2.5	3.5	4.4	3.6
17	3.5	.....	3.7	3.7	.....	2.3	2.7	2.25	2.7	3.15	3.45	3.7
18	3.1	.....	4.1	3.6	3.45	2.4	2.45	1.9	2.1	3.2	3.7	3.7
19	3.9	.....	4.05	3.4	3.35	2.65	2.4	2.2	2.05	3.05	3.65	3.6
20	3.45	.....	3.8	3.35	3.3	2.8	2.5	2.15	2.15	2.6	3.55	3.4
21	4.15	.....	3.7	3.1	3.15	2.75	2.35	2.05	2.4	3.2	3.55	3.6
22	3.9	4.7	3.65	3.5	3.05	2.8	2.2	1.8	2.55	3.15	3.5	5.5
23	3.9	.....	4.0	3.35	3.05	2.4	2.5	1.85	3.0	3.2	3.5	4.2
24	5.1	.....	4.6	3.45	2.95	2.4	2.5	2.55	5.1	3.1	3.1	5.05
25	.....	.....	4.25	3.6	2.75	2.5	2.4	2.65	4.4	3.15	3.8	3.7
26	.....	.....	3.95	3.5	2.55	2.75	2.6	2.2	3.6	2.95	4.0	3.7
27	.....	.....	3.85	3.3	3.4	2.5	2.4	2.1	3.35	2.65	3.9	4.15
28	.....	4.3	3.95	3.1	3.05	2.6	2.35	2.15	3.05	2.6	3.75	3.95
29	.....	.....	4.0	3.0	3.25	2.5	2.65	2.1	4.15	4.5	3.7	4.05
30	.....	.....	4.0	3.0	2.60	2.5	2.55	2.0	3.65	4.8	3.5	4.35
31	.....	.....	4.0	.....	2.75	.....	2.5	1.9	.....	4.45	.....	4.95

[a] Ice conditions from about January 24 to March 10, 1907.

Daily gage height, in feet, of Ware River near Ware, Mass., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.[a]												
1	4.5	5.1	3.5	3.85	3.25	3.75	2.55	2.2	2.6	3.2	2.35	2.75
2	4.3	.....	3.8	3.65	3.1	3.5	2.2	2.1	2.9	3.55	2.55	2.6
3	3.9	.....	3.25	3.55	3.15	3.35	1.8	2.3	2.6	2.3	2.5	2.5
4	3.5	.....	3.2	3.3	3.3	3.25	1.9	2.35	2.6	2.5	2.45	2.7
5	3.3	.....	2.95	3.1	3.3	3.2	2.0	2.55	2.6	2.8	2.45	2.45
6	3.75	.....	3.1	3.4	3.25	2.75	2.65	2.65	2.3	2.7	1.35	2.4
7	3.8	.....	3.0	3.45	3.05	2.3	2.6	3.9	2.15	2.55	1.3	2.6
8	4.6	.....	3.15	3.4	3.8	2.9	2.5	3.75	2.35	2.6	1.85	3.0
9	4.55	.....	3.05	3.75	4.05	3.0	2.15	3.9	2.45	2.5	2.7	3.1
10	4.0	.....	3.15	3.7	3.9	2.9	2.2	2.9	2.4	2.6	2.7	3.0
11	3.7	.....	2.95	3.55	3.8	2.75	1.8	2.9	2.65	2.55	2.15	3.25
12	3.65	.....	3.15	3.35	3.6	2.75	1.9	2.95	1.95	2.65	2.1	2.75
13	4.95	.....	3.8	3.4	3.5	2.05	2.0	2.9	2.35	2.8	2.15	2.55
14	5.0	3.9	4.7	3.3	3.3	2.4	2.65	3.9	2.65	2.8	1.9	3.0
15	4.3	7.1	4.8	3.35	3.5	2.7	2.5	3.9	2.6	2.95	2.1	2.8
16	4.1	6.95	5.3	3.6	3.2	2.9	2.7	3.2	2.3	2.8	2.55	2.75
17	3.8	6.0	4.8	3.45	3.1	2.6	2.35	3.1	2.5	2.5	2.55	2.75
18	3.6	4.75	4.05	3.35	3.1	2.4	2.2	3.5	2.75	1.6	2.75	2.75
19	3.5	4.35	3.8	3.4	3.0	2.5	2.2	3.2	2.4	2.5	2.55	2.5
20	3.6	4.5	3.75	3.6	2.9	2.5	2.8	2.85	2.25	2.75	2.5	2.45
21	3.5	4.2	3.6	3.6	2.9	2.2	2.55	2.65	2.35	2.4	2.35	2.7
22	3.4	4.6	3.45	3.45	3.15	2.4	2.4	3.1	2.5	2.4	2.4	2.8
23	3.25	3.5	3.55	3.25	3.35	2.2	2.5	3.05	2.75	2.4	2.65	2.8
24	4.8	4.7	3.75	3.2	3.25	2.2	2.7	2.75	3.0	2.3	2.75	2.65
25	4.15	4.5	4.0	3.6	3.15	2.65	2.7	2.6	2.7	1.65	2.55	2.0
26	4.5	3.6	3.8	2.95	2.95	2.6	2.7	2.6	2.3	2.5	2.5	2.3
27	4.35	3.4	3.9	3.2	2.8	2.1	2.8	3.0	1.9	2.75	2.5	2.1
28	4.5	3.7	3.4	3.2	2.95	2.15	3.0	2.85	2.2	2.4	2.35	2.85
29	3.6	3.6	3.75	3.1	2.65	2.45	2.25	2.55	3.1	2.75	2.4	2.6
30	3.9	.....	3.6	3.0	2.55	2.6	2.2	2.4	2.85	2.6	2.6	2.75
31	4.75	.....	3.9	.....	3.6	.....	2.35	2.8	.....	2.6	.....	2.65

[a] Ice conditions about January 31 to February 14, 1908. Discharge may have been affected by ice conditions during December, 1908. During the frozen seasons, 1907–8, gage heights are to surface of water in a hole in the ice.

QUABOAG RIVER AT WEST WARREN, MASS.

This station, which was established October 22, 1904, to obtain general statistical data regarding the flow of this stream, upon which there is considerable undeveloped fall, was discontinued May 1, 1907. It is located at the dam of J. T. F. MacDonnell, of Holyoke, which is leased by the Composite Leather Company, manufacturers of leather board. This dam is the lowest of the numerous dams in Warren and West Warren, and is about one-fourth mile below the West Warren railroad station.

The dam is of timber cribwork, 102.7 feet long, and affords a fall of about 13 feet. A number of current-meter measurements have been made to check the computed flow over the dam. The estimates of discharge are based on one daily gage reading taken week days just before the mills start operation in the morning, and in the afternoon on Sundays, the time being chosen after a study of automatic gage heights taken in 1903 by the state board of health (See Water-Supply Paper 165, p. 139.) Thus only the dam is used at this station. The observer is Amory Crossman.

There is little effect from ice in winter, and the results at this station are considered to be excellent, except during very low water, when they are only fair.

Daily discharge, in second-feet, of Quaboag River at West Warren, Mass., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1	539	141	106	476	16	476	106	476	571
2	539	161	123	476	17	539	a 123	a 476	476
3	476	a 161	a 123	476	18	476	123	476	476
4	476	123	123	446	19	476	123	476	416
5	476	123	123	446	20	a 416	141	416	416
6	a 416	141	123	446	21	416	141	416	a 416
7	416	141	89	a 416	22	358	161	476	416
8	306	123	89	416	23	306	161	476	358
9	254	106	89	416	24	306	a 205	a 476	332
10	254	a 106	a 72	416	25	254	205	476	306
11	254	106	72	446	26	254	205	476	280
12	280	123	123	416	27	a 229	123	476	280
13	a 306	123	306	446	28	229	106	476	a 254
14	123	123	306	a 446	29	161	.....	416	254
15	123	106	358	675	30	141	.....	416	254
					31	141	.....	a 476	.....

a Sunday.

Monthly discharge of Quaboag River at West Warren, Mass., for 1907.

[Drainage area, 144 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)
	Maximum.	Minimum.	Mean.	Per square mile.	
January	539	123	336	2.33	2.69
February	205	106	137	.951	.99
March	476	72	310	2.15	2.48
April	675	254	412	2.86	3.19

WESTFIELD LITTLE RIVER NEAR BLANDFORD, MASS.

Westfield Little River is formed by the union of Peebles and Borden brooks in the southern part of the town of Blandford. The headwaters of Peebles Brook are in North Blandford, at an elevation of about 1,400 feet, while at its junction with Borden Brook it has an elevation of about 850 feet—a fall of 550 feet in a distance of about 8 miles. Below Borden Brook the fall is also very rapid, reaching an elevation of 200 feet in the vicinity of West Parish, a distance of 6 miles from Borden Brook. The drainage area at the junction of Peebles and Borden brooks is about 43 square miles; at the mouth of the river, 83.6 miles. The slopes are very steep and in places precipitous. The greater part of the basin above West Parish is in forest. It is expected that Westfield Little River will be used as the municipal water supply for the city of Springfield,

for which a dam and reservoir are being planned in the vicinity of Cobble Mountain.

This station, which is located a short distance below Borden Brook, at Cobble Mountain, near Blandford, Mass., was established July 13, 1905, and has been maintained since that time in cooperation with the water board of the city of Springfield through its engineer, E. E. Lochridge.

The gage datum has remained the same during the maintenance of the station. During the winter months the discharge is affected by ice. Conditions for obtaining accurate discharge data are good, and an excellent rating curve has been developed.

On August 10, 1906, a sharp-crested weir, with crest about 30 feet long, capable of carrying a depth of flow of 1½ feet, was installed a short distance downstream from the current-meter station. This was maintained with some interruptions until September, 1907, when it was destroyed by high water. Estimates of flow over the weir as given are based upon the coefficients given on page 36, Water-Supply Paper 200. The weir gage was read at approximately the same times as the current-meter gage, and considerable comparative information upon the accuracy at this station has been obtained (see also Water-Supply Paper 201, pp. 105–110).

Discharge measurements of Westfield Little River near Blandford, Mass., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. feet.*	*Feet.*	*Sec.-ft.*
April 24	Wood and Mention	66	156	4.20	472
April 27	do	45.5	78.3	3.12	113
Do	do	45	77.4	3.10	114
Do	do	45	78.1	3.09	118
May 17	D. M. Wood	54.5	117	3.76	309
Do	Barrows and Norcross	54.5	111	3.71	278
July 19[a]	do	21.5	17.7	2.03	11.5
August 22	T. W. Norcross	6.5	6.17	1.78	4.80
Do	do	6.5	6.15	1.78	4.89
Do	do	6.5	6.15	1.78	5.09
Do	do	6.5	6	1.78	4.85
Do	do	6.5	5.89	1.72	4.09
Do	do	6.5	5.98	1.70	4.03
August 23	do	6.5	6.11	1.73	4.70
Do	do	6.5	6	1.73	4.81
Do	do	6.5	6.10	1.73	4.57
Do	do	6.5	5.84	1.74	4.37
Do	do	6.5	6.01	1.73	4.36
Do	do	6.5	6.09	1.73	4.41
Do	do	6.5	6.24	1.72	4.48
Do	do	6.5	6.19	1.71	4.46
Do	do	6.5	6.03	1.71	4.21
Do	do	6.5	5.92	1.71	3.58
1908.					
April 24	D. M. Wood	46.5	77.1	2.85	69.4
Do	do	46.5	75.4	2.85	76.7
September 25[a]	Wood and French	22	17.5	1.68	3.9
October 19[b]	do	14	17.6	1.88	9.0
Do.[c]	do	17.5	18.3	1.87	4.4
December 21[d]	do	31	40.1	2.20	18.1

[a] Wading measurement.
[b] Wading measurement 100 feet above old weir.
[c] Wading measurement made near chain gage.
[d] Ice measurement made at cable station.

Daily gage height, in feet, of Westfield Little River near Blandford, Mass., for 1907–8.

[S. H. Bodurtha and W. V. Bodurtha, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	.....	.....	[b] 3.36	2.81	2.81	2.51	1.84	1.65	3.29	3.49	2.71
2	.....	.....	.....	3.18	2.78	3.63	2.38	1.87	1.63	2.99	3.48	2.73
3	.....	.....	.....	3.09	2.73	4.05	2.31	1.83	1.93	2.85	5.40	2.78
4	.....	.....	.....	3.03	2.99	3.58	2.16	1.98	2.55	3.25	4.45	2.81
5	.....	.....	.....	3.08	2.94	3.57	2.12	1.89	2.48	2.95	3.63	2.83
6	.....	.....	.....	3.03	2.84	3.73	2.11	2.02	2.36	2.78	4.92	2.81
7	.....	.....	.....	2.98	2.95	3.45	2.08	1.96	2.17	2.77	5.85	2.88
8	.....	.....	.....	2.88	2.89	3.14	2.07	1.81	2.05	4.86	4.28	3.01
9	.....	.....	.....	[b] 2.88	2.90	2.94	2.05	1.88	2.01	3.81	3.75	4.45
10	.....	.....	.....	[b] 2.84	2.91	2.83	2.03	1.81	2.03	3.33	3.51	4.50
11	.....	.....	.....	2.91	2.95	2.81	2.27	1.81	2.49	3.11	3.49	3.63
12	.....	.....	.....	2.91	2.86	2.73	2.52	1.72	2.60	3.15	3.28	3.35
13	.....	.....	.....	3.04	2.74	2.69	2.48	1.78	2.21	2.95	3.15	3.31
14	.....	.....	.....	3.14	2.66	2.66	2.20	1.85	2.12	2.85	3.05	3.27
15	.....	.....	.....	3.42	2.61	2.65	2.09	1.79	2.04	2.77	2.98	3.24
16	.....	.....	.....	3.28	3.28	2.59	2.07	1.73	2.01	2.68	2.88	3.23
17	.....	.....	.....	3.35	3.83	2.53	2.05	2.00	2.03	2.61	2.85	3.22
18	.....	.....	.....	3.20	3.35	2.52	2.10	1.93	1.99	2.53	2.79	3.19
19	.....	.....	.....	3.15	3.13	2.98	2.02	1.77	2.04	2.49	2.98	3.18
20	.....	.....	.....	3.05	3.03	2.61	2.02	1.81	1.99	2.88	2.88	3.15
21	.....	.....	.....	2.98	2.83	2.52	2.27	1.83	1.96	2.75	2.78	3.13
22	.....	.....	.....	2.95	2.74	2.44	2.13	1.71	1.98	2.65	2.98	3.12
23	.....	.....	.....	3.04	2.69	2.39	2.03	1.72	3.53	2.57	2.88	3.15
24	.....	.....	.....	3.90	2.62	2.35	1.96	1.93	4.18	2.53	2.83	4.72
25	.....	.....	.....	3.44	2.61	2.31	1.95	1.81	3.31	2.48	2.91	3.73
26	.....	.....	3.60	3.15	2.59	2.28	2.03	1.71	2.91	2.44	2.85	3.37
27	.....	.....	3.58	3.02	3.35	2.19	1.97	1.65	2.73	5.58	2.75	3.28
28	.....	.....	4.12	2.95	3.35	2.17	1.83	1.78	2.59	7.42	2.72	3.28
29	.....	.....	4.25	2.87	2.95	2.15	1.81	1.77	5.02	6.15	2.85	3.29
30	.....	.....	3.98	2.85	2.85	2.78	1.86	1.76	3.78	4.85	2.72	3.93
31	.....	.....	3.66	.....	2.70	.....	1.81	1.66	.....	3.83	.....	4.12
1908.[c]												
1	3.64	3.59	3.05	3.61	4.62	3.41	1.83	1.93	1.90	2.04	2.17	1.99
2	3.24	3.47	3.09	3.48	3.54	2.89	2.27	1.88	1.88	2.00	2.13	1.99
3	3.11	3.48	2.94	3.31	3.51	2.65	3.19	1.84	1.86	1.96	2.09	1.97
4	2.99	3.47	2.75	3.21	3.31	2.55	2.79	1.91	1.85	1.93	2.06	1.96
5	3.29	.....	2.66	3.19	2.98	2.45	2.54	2.01	1.84	1.86	2.05	1.95
6	3.89	.....	2.59	3.27	2.91	2.45	2.38	2.52	1.81	1.84	2.04	1.93
7	3.64	3.04	2.61	3.29	3.09	2.43	2.29	2.75	1.82	1.83	2.03	2.84
8	3.34	2.77	2.57	3.57	4.78	2.40	2.24	2.53	1.79	1.82	2.03	2.84
9	3.09	2.60	2.61	4.10	3.77	2.33	2.18	2.31	1.78	1.81	2.01	2.94
10	2.99	2.54	2.57	3.61	3.52	2.25	2.08	2.27	1.75	1.79	1.99	2.93
11	3.49	2.51	2.61	3.39	3.33	2.19	1.99	2.27	1.74	2.06	1.98	2.89
12	4.32	2.51	2.65	3.27	3.17	2.17	2.01	2.19	1.75	1.97	1.97	2.75
13	5.10	2.57	3.57	3.15	3.01	2.13	2.01	2.14	1.73	1.87	1.96	2.69
14	4.50	2.75	3.64	3.09	3.01	2.08	2.01	2.08	1.73	1.84	1.96	2.67
15	4.02	5.18	3.84	3.04	3.09	2.12	2.05	2.04	1.71	1.83	2.05	3.04
16	3.49	4.60	3.97	3.01	2.91	2.33	2.01	2.04	1.71	1.79	2.13	2.87
17	3.14	3.54	4.02	3.07	2.84	2.21	1.98	2.17	1.69	1.78	2.11	2.75
18	2.99	3.27	3.91	3.01	2.73	2.13	2.01	2.17	1.67	1.85	2.13	2.67
19	3.01	3.24	3.94	3.08	2.68	2.10	2.03	2.08	1.67	1.85	2.13	.....
20	3.09	3.29	3.64	3.04	2.64	2.09	2.01	1.99	1.65	1.85	2.15	.....
21	3.11	3.24	3.41	3.03	3.29	1.99	1.99	1.93	1.68	1.84	2.15	2.29
22	3.09	3.17	3.31	2.99	4.15	2.01	2.05	2.07	1.67	1.83	2.13	2.26
23	3.14	3.14	3.34	2.87	3.69	2.51	2.08	1.97	1.68	1.80	2.13	2.21
24	3.21	3.11	4.48	2.87	3.35	2.63	1.97	1.93	1.67	1.80	2.12	2.15
25	3.34	3.08	4.72	2.83	3.08	2.33	2.37	2.20	1.64	1.88	2.15	2.13
26	3.29	3.07	4.78	2.81	2.72	2.15	2.38	2.00	1.66	2.47	2.21	2.11
27	3.17	3.04	5.18	2.81	2.64	2.07	2.14	1.98	1.67	2.57	2.19	2.10
28	3.11	3.02	5.40	2.84	2.57	1.99	2.10	1.96	1.67	2.35	2.13	2.07
29	3.27	3.02	5.30	2.81	2.48	1.93	2.08	1.94	2.54	2.28	2.05	2.03
30	3.64	.....	4.18	2.84	2.45	1.90	2.04	1.90	2.14	2.23	2.01	2.00
31	3.69	.....	3.75	.....	4.60	.....	1.99	1.89	.....	2.20	.....	2.33

[a] River frozen January 1 to March 25, 1907.
[b] Gage height determined from the established relation between the weir and meter station gages.
[c] Ice conditions prevailed January 1 to 11 and January 29 to February 7, 1908. It is probable that conditions of flow were also affected by ice conditions for short periods, January to March and December, 1908.

Daily gage height, in feet, on weir of Westfield Little River near Blandford, Mass., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.96	0.89	.....	1.30	0.75	0.71	0.46	0.19	0.11
2	1.68	.94	0.52	1.12	.70	1 61	.35	.23	.10
3	1.28	.92	.73	1.02	.66	2.26	.30	.19	.23
4	2.13	.86	.64	.94	.92	1.58	.24	.27	.73
5	1.76	.83	.55	.98	.86	1.58	.18	.19	.66
6	1.59	.82	.52	.92	.76	1.76	.17	.31	.55
7	.73	78	.50	.88	.86	1.40	.17	.26	.43
8	1.36	.74	.48	.79	.80	1.08	.17	.19	.32
9	1.43	.67	.46	.80	.79	.89	.43	.20	.29
10	1.13	.63	.45	.76	.79	.76	.41	.18	.31
11	.96	.59	.43	.78	.82	.74	.45	.18	.67
12	.86	.54	.43	.86	.76	.68	.54	.13	.73
13	.76	.53	.50	.99	.66	.62	.35	.17	.44
14	.67	.59	.62	1.08	.58	.57	.28	.20	.37
15	.64	.62	1.24	1.40	.54	.58	.....	.18	.31
16	.57	.60	1.08	1.24	1.26	.51	.46	.14	.29
17	.60	.58	1.24	1.29	1.88	.50	.43	.29	.30
18	.67	.56	1.46	1.14	1.32	.49	.45	.23	.29
19	1.33	.54	1.50	1.08	1.04	.94	.31	.16	.30
20	1.91	.56	1.52	1.00	.93	.58	.31	.17	.28
21	1.22	.58	1.48	.94	.74	.49	.48	.....	.27
22	1.19	.56	1.54	.89	.64	.42	.37	.....	.28
23	.93	.52	2.40	.98	.60	.38	.31	.....	.....
24	.93	.....	2.25	1.97	.53	.32	.29	.24	.....
25	.96	.....	1.60	1.48	.52	.29	.24	.17	.....
26	.98	.....	1.54	1.14	.54	.28	.32	.11	.....
27	.98	.....	1.54	.98	1.22	.20	.27	.11	.....
28	.96	.....	2.05	.93	1.32	.16	.19	.16	.....
29	.92	.....	2.19	.82	.85	.12	.18	.15	.....
30	.88	.....	1.92	.78	.74	.77	.20	.19	.....
31	.88	.....	1.59	.....	.61	.....	.19	.11	.....

NOTE.—On March 23, the weir was considerably damaged by floating ice and the crest angle iron was partly bent over. The weir underwent repairs July 9 to 20 and August 21 to 24.

Length of weir July 9 to 11, inclusive, 8.6 feet.

July 15, gage reading, a. m., 0.25; p. m. 0.49; weir length (p. m.) 11.8 feet, continuing to July 17, inclusive.

Length of weir July 18, 13 feet.

Length of weir, July 19–20, 17.82 feet with flashboards 12.2 feet long and at elevation 100.58 feet (weir crest at elevation 100 feet). Flashboards remained to August 23, inclusive.

Length of weir August 21 (a. m.), 17.82 feet; gage reading, 0.21.

Length of weir August 21 (p. m.) and August 22 (a. m.), 29.98 feet; gage readings, 0.11 and 0.09 foot, respectively.

Length of weir August 22 (p. m.) and August 23 (a. m.), 10.25 feet; gage readings, 0.21 and 0.22 foot, respectively.

Length of weir August 23 (p. m.), 5.09 feet; gage reading, 0.31 foot.

Length of weir August 24, 17.85 feet. Flashboards at elevation 100.66 August 24 to September 22, inclusive.

Weir damaged by high water September 23; no further readings recorded.

Rating table for Westfield Little River near Blandford, Mass., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.63	2.8	2.40	26.4	3.40	186	5.00	745
1.65	3.0	2.45	29.9	3.50	220	5.20	815
1.70	3.7	2.50	33.8	3.60	255	5.40	885
1.75	4.4	2.55	38.1	3.70	290	5.60	955
1.80	5.2	2.60	42.8	3.80	325	5.80	1,025
1.85	6.0	2.65	47.8	3.90	360	6.00	1,095
1.90	7.0	2.70	53.1	4.00	395	6.20	1,165
1.95	8.0	2.75	58.7	4.10	430	6.40	1,235
2.00	9.2	2.80	64.7	4.20	465	6.60	1,305
2.05	10.6	2.85	71.1	4.30	500	6.80	1,375
2.10	12.2	2.90	77.9	4.40	535	7.00	1,445
2.15	14.0	2.95	85.0	4.50	570	7.20	1,515
2.20	16.0	3.00	92.4	4.60	605	7.40	1,585
2.25	18.2	3.10	109	4.70	640		
2.30	20.6	3.20	129	4.80	675		
2.35	23.3	3.30	155	4.90	710		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made during 1905–1908, and is well defined. Above gage height 3.5 feet the rating curve is a tangent, the difference being 35 per tenth.

Daily discharge,[a] in second-feet of Westfield Little River near Blandford, Mass., 1907, as determined by weir and by current-meter ratings.

	January.	February.	March.			April.			May.			June.			July.			August.			September.		
	Weir.	Weir.	Weir.	Current meter.	Per cent difference.	Weir.	Current meter.	Per cent difference.	Weir.	Current meter.	Per cent difference.	Weir.	Current meter.	Per cent difference.	Weir.	Current meter.	Per cent difference.	Weir.	Current meter.	Per cent difference.	Weir.	Current meter.	Per cent difference.
1	384	82.8	37.1	.....	.....	145	173	+19	64.2	66.0	+ 3	59.0	66.0	+ 12	31.0	34.7	+ 12	5.0	5.8	+16	[b] 2.3	3.0	+30
2	283	89.6	37.1	.....	.....	116	125	+ 8	57.8	62.3	+ 8	[b] 238	266	+ 12	20.7	25.1	+ 21	6.6	6.4	− 3	2.0	2.8	+40
3	142	[b] 86.8	[b] 61.6	.....	.....	101	107	+ 6	53.1	56.5	+ 6	420	412	− 2	16.5	21.1	+ 28	5.0	5.7	+14	6.6	7.6	+15
4	448	78.7	50.7	.....	.....	89.6	97.0	+ 8	86.8	90.9	+ 5	227	248	+ 9	11.9	14.4	+ 21	[b] 8.4	8.7	+ 4	37.4	38.1	+ 2
5	311	74.6	40.4	.....	.....	95.4	105	+10	[b] 78.7	83.6	+ 6	227	244	+ 7	7.8	12.9	+ 65	5.0	6.8	+36	31.5	32.2	+ 2
6	[b] 248	73.2	37.1	.....	.....	86.8	97.0	+12	65.4	69.8	+ 7	279	300	+ 7	7.2	12.6	+ 75	10.3	9.8	− 5	24.0	23.9	− 0.4
7	61.6	68.0	35.0	.....	.....	[b] 81.5	89.4	+10	78.7	85.0	+ 8	162	203	+ 25	[b] 7.2	11.6	+ 61	7.9	8.2	+ 4	16.6	14.8	−11
8	156	62.9	33.0	.....	.....	69.2	75.2	+ 9	70.5	76.5	+ 9	110	117	+ 6	7.2	11.2	+ 56	5.0	5.3	+ 6	[b] 10.8	10.6	− 2
9	168	54.3	31.0	.....	.....	70.5	75.2	+ 7	69.2	77.9	+13	[b] 82.8	83.6	+ 1	8.0	10.6	+ 32	5.4	6.6	+22	9.3	9.5	+ 2
10	118	[b] 49.5	[b] 30.0	.....	.....	65.4	69.8	+ 7	69.2	79.3	+15	65.4	68.5	+ 5	7.4	10.0	+ 35	4.6	5.3	+15	10.3	10.0	− 3
11	925	44.8	28.0	.....	.....	68.0	79.3	+17	73.2	85.0	+16	62.9	66.0	+ 5	8.5	19.2	+126	[b] 4.6	5.3	+15	32.5	33.0	+ 2
12	78.7	39.3	28.0	.....	.....	78.7	79.3	+ 0.8	[b] 65.4	72.5	+11	55.5	56.5	+ 2	39.3	35.5	− 10	2.9	4.0	+38	37.4	42.8	+14
13	[b] 65.4	38.2	35.0	.....	.....	96.8	98.5	+ 2	53.1	57.6	+ 8	48.3	52.0	+ 8	20.7	32.2	+ 56	4.3	4.9	+14	17.2	16.4	− 5
14	54.3	44.8	48.3	.....	.....	[b] 110	117	+ 6	43.7	48.9	+12	42.6	48.9	+ 15	[b] 14.9	16.0	+ 7	5.4	6.0	+11	13.3	12.9	− 3
15	50.7	48.3	136	.....	.....	162	193	+19	39.3	43.8	+11	43.7	47.8	+ 9	13.0	11.9	− 8	4.6	5.0	+ 9	[b] 10.3	10.3	0
16	42.6	46.0	110	.....	.....	136	149	+10	139	149	+ 7	[b] 36.0	41.9	+ 16	12.1	11.2	− 8	3.2	4.1	+28	9.3	9.5	+ 2
17	46.0	[b] 43.7	[b] 136	.....	.....	144	170	+18	356	336	− 6	35.0	36.4	+ 4	11.0	10.6	− 4	9.3	9.2	− 1	9.8	10.0	+ 2
18	54.3	41.5	173	.....	.....	120	129	+ 7	149	170	+14	34.0	35.5	+ 4	12.9	12.2	− 5	[b] 6.6	7.6	+15	9.3	9.0	− 3
19	150	39.3	180	.....	.....	110	119	+ 8	[b] 104	115	+11	89.6	89.4	− 0.2	10.2	9.8	− 4	3.9	4.7	+20	9.8	10.3	+ 5
20	[b] 364	41.5	218	.....	.....	98.3	100	+ 2	88.2	97.0	+10	43.7	43.8	0	10.2	9.8	− 4	4.3	5.3	+23	8.8	9.0	+ 2
21	133	43.7	177	.....	.....	[b] 89.6	89.4	− 0.2	62.9	68.5	+ 9	34.0	35.5	+ 4	[b] 19.6	19.2	− 2	4.8	5.7	+19	8.4	8.2	− 2
22	128	41.5	224	.....	.....	82.8	85.0	+ 3	50.7	57.6	+14	27.0	29.2	+ 8	13.3	13.3	0	3.1	3.8	+23	[b] 8.8	8.7	− 1
23	88.2	37.1	545	.....	.....	95.4	98.5	+ 3	46.0	52.0	+13	[b] 23.3	25.8	+ 11	10.3	10.0	− 3	3.2	4.0	+25	.....	.....	.....
24	88.2	[b] 37.1	[b] 493	.....	.....	388	360	− 7	38.2	44.8	+17	18.1	23.3	+ 29	9.3	8.2	− 12	7.1	7.6	+ 7	.....	.....	.....
25	92.5	37.1	251	.....	.....	177	200	+13	37.1	43.8	+18	15.7	21.1	+ 34	7.1	8.0	+ 13	[b] 4.3	5.3	+23	.....	.....	.....
26	95.4	37.1	224	255	+14	120	119	− 0.8	[b] 39.3	41.9	+ 7	14.9	19.6	+ 32	10.8	10.0	− 7	2.3	3.8	+65	.....	.....	.....
27	[b] 95.4	37.1	224	248	+11	95.4	95.4	0	133	170	+28	9.1	15.6	+ 71	8.4	8.5	+ 1	2.3	3.0	+30	.....	.....	.....
28	92.5	37.1	416	437	+ 5	[b] 88.2	85.0	− 4	149	170	+14	6.6	14.8	+124	[b] 5.0	5.7	+ 14	3.9	4.9	+26	.....	.....	.....
29	86.8	.....	469	482	+ 3	73.2	73.8	+ 0.8	77.4	85.0	+10	4.3	14.0	+226	4.6	5.3	+ 15	3.6	4.7	+30	.....	.....	.....
30	81.5	.....	367	390	+ 6	68.0	71.1	+ 4	62.9	71.1	+13	[b] 66.7	62.3	− 7	5.4	6.2	+ 15	5.0	4.6	− 8	.....	.....	.....
31	81.5	.....	[b] 248	276	+11	.....	.....	.....	47.1	53.1	+13	.....	.....	.....	5.0	5.3	+ 6	2.3	3.1	+35	.....	.....	.....
Mean	141	52.0	165	[c] 348	+ 7	111	117	+ 5	82.2	89.7	+ 9	86.0	92.9	+ 8	12.1	13.9	+ 15	4.97	5.65	+14	14.8	15.1	+ 2

[a] See footnotes to weir station gage heights and monthly discharge.

[b] Sundays.

[c] March 26 to 31.

Monthly discharge of Westfield Little River near Blandford, Mass., for 1907–8.

[Drainage area, 43 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	448	42.6	141	3.28	3.78	B.
February	89.6	37.1	52.0	1.21	1.26	B.
March	545	28.0	170	3.95	4.55	B.
April	360	69.8	117	2.72	3.04	A.
May	336	41.9	89.7	2.09	2.41	A.
June	412	14.0	92.9	2.16	2.41	A.
July	35.5	5.3	13.9	.323	.37	A.
August	9.8	3.0	5.65	.131	.15	A.
September	752	2.8	80.9	1.88	2.10	A.
October	1,590	29.2	242	5.63	6.49	A.
November	1,040	55.3	222	5.16	5.76	A.
December	647	54.4	191	4.44	5.12	B.
The year	1,590	2.8	118	2.75	37.44	
1908.						
January	780	90.9	165	3.84	4.43	C.
February	808	34.7	141	3.28	3.54	B.
March	885	39.9	292	6.79	7.83	A.
April	430	66.0	134	3.12	3.48	A.
May	668	29.9	180	4.19	4.83	A.
June	189	7.0	27.4	.637	.71	A.
July	127	5.7	18.8	.437	.50	A.
August	58.7	5.8	14.1	.328	.38	A.
September	37.3	2.9	5.71	.133	.15	A.
October	39.9	4.9	10.0	.233	.27	A.
November	16.4	8.2	11.8	.274	.31	A.
December	98.5	7.6	35.6	.828	.95	A.
The year	885	2.9	86.3	2.01	27.38	

NOTE.—Discharge January 1 to March 25, 1907, taken from the discharge over the weir in order to complete the year. Discharge during the frozen periods 1908, estimated.

	Sec.-ft.
Discharge January 1 to 11, 1908	100
January 24 to February 7, 1908	100

Open-channel rating applied December, 1908. Measurements made December 21, 1908, and January 1, 1909, show no material reduction in discharge due to ice conditions.

Discharge interpolated December 19 to 20, 1908.

Monthly discharge (by weir) of Westfield Little River near Blandford, Mass., for 1907.

[Drainage area, 43 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	448	42.6	141	3.28	3.78
February	89.6	37.1	52.0	1.21	1.26
March	545	28.0	165	3.84	4.43
April	388	65.4	111	2.58	2.88
May	356	37.1	82.2	1.91	2.20
June	420	4.3	86.0	2.00	2.23
July	39.3	4.6	12.1	.281	.32
August	10.3	2.3	4.97	.116	.13
September 1 to 22	37.4	2.0	14.8	.344	.28

NOTE.—The discharge by the weir from about March 23 to August 31 is considerably in error as shown by the daily comparison between the current meter and weir stations. This is due to the damaged condition of the weir and also to leakage.

The discharge for days when the gage height at the weir was greater than 1.50 feet was determined from the current meter station rating by means of the known gage height relation which exists between the two stations.

Discharge interpolated February 24 to March 1.

HOUSATONIC RIVER DRAINAGE BASIN.

DESCRIPTION.

Housatonic River rises in Berkshire County, Mass., and flows southward, entering Long Island Sound near the west end of Connecticut. It is about 125 miles long, and drains a total area of about 1,930 square miles. Its most important tributaries are Tenmile River, a stream lying almost entirely in New York State and entering the river near Gaylordsville, and Naugatuck River, with a drainage area of 313 square miles, which enters at Birmingham and is entirely in the State of Connecticut. In the vicinity of Pittsfield the Housatonic reaches an elevation of about 1,500 feet, this being a hilly and mountainous region. Through Connecticut the river in general runs through a wide valley, much of which is in farm land. In most places the bed of the river is of gravel, but in a few localities there are falls over ledges of limestone and granite. The basin is to some extent in forest cover, especially in its upper portions, but as a whole it may be said to consist largely of farm lands.

The mean annual precipitation is probably about 43 inches. In the upper portion of the basin the winters are severe, but as a whole the area is sufficiently far south so that the river is open during a considerable part of the winter season.

In the whole drainage basin there are some 15 square miles of lake and pond surface, but generally speaking, storage has been very little developed and there are numerous opportunities for improvements of this nature.

Power has been developed at Birmingham, New Milford and recently at Bulls Bridge above Gaylordsville, and at a number of other places, but there remains considerable unutilized power both on the main river and its tributaries.

A gaging station has been maintained at Gaylordsville on the main river since 1900, and during this period the driest year was 1908 and the wettest 1903, the total flow during these two years being about in the ratio of 1 to 2.03.

The following gaging stations have been maintained in this river basin:

Housatonic River at Gaylordsville, Conn. (1900–1908).
Tenmile River at Dover Plains, N. Y. (1901–1903).

HOUSATONIC RIVER AT GAYLORDSVILLE, CONN.

This station, which is located at the covered wooden highway bridge at Gaylordsville, about 2 miles below the mouth of Tenmile River, was established October 24, 1900, to obtain general statistical and comparative data regarding the flow of the river.

The nearest dam downstream is at New Milford, distant about 7 miles, while upstream, at Bulls Bridge, a few miles is a recent development. There is no backwater effect from the dam below the station at low and medium stages. There may, however, be a slight effect at high stages.

The gage datum has remained the same during the maintenance of the station. The discharge is affected by ice during short periods of the winter. Conditions for obtaining accurate discharge data are good, and a good rating curve has been developed.

Discharge measurements of Housatonic River at Gaylordsville, Conn., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 25 [a]	Wood & French	67.0	75.4	2.40	83.2
Do. [b]	do	112	169	[c] 2.60	128

[a] Measurement made by wading 150 feet below the cable.
[b] Measurement made from the cable.
[c] Gage height rose 0.5 foot during the measurement due to the opening of gates at the power house above.

Daily gage height, in feet, of Housatonic River at Gaylordsville, Conn., for 1907–8.

[G. H. Munroe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907. [a]												
1	5.8	4.3	3.95	5.75	4.95	4.8	4.65	3.65	3.15	5.4	8.9	5.2
2	6.05	4.5	3.95	5.55	4.95	4.85	4.45	3.65	3.05	5.35	8.7	5.1
3	5.8	4.5	3.95	5.15	4.95	5.25	4.3	3.45	2.85	5.0	8.2	5.1
4	5.6	4.5	4.05	5.05	4.6	6.35	4.25	3.45	3.4	5.1	7.6	4.7
5	5.7	3.9	4.15	5.05	4.95	6.25	3.85	3.55	3.85	5.65	7.3	4.7
6	5.5	4.2	3.95	4.95	4.65	6.45	3.8	3.55	4.25	5.4	6.8	4.5
7	5.5	4.2	4.05	4.95	4.95	6.35	4.25	3.45	4.1	4.9	7.8	4.4
8	5.3	4.5	4.05	4.95	4.95	5.95	3.95	3.45	3.85	5.1	7.9	4.4
9	5.45	4.35	3.85	4.95	4.95	5.85	3.95	3.25	3.55	6.5	7.75	4.5
10	5.2	4.4	4.05	4.95	4.65	5.55	4.05	3.45	3.55	6.2	7.6	4.9
11	4.9	4.3	3.95	5.05	4.75	5.45	3.65	3.45	3.65	5.7	7.0	6.4
12	4.9	4.3	3.75	5.15	4.95	5.3	4.15	3.45	4.25	5.7	6.6	6.8
13	4.6	4.2	3.95	5.1	4.95	5.25	4.35	3.45	4.25	5.7	6.3	6.4
14	4.9	4.4	4.15	5.15	4.55	4.75	4.15	3.45	3.9	5.4	6.3	6.5
15	4.8	4.4	5.85	5.55	4.6	4.75	4.35	3.35	3.75	5.3	5.9	5.9
16	4.4	4.3	6.0	5.35	4.65	4.85	3.95	3.45	3.6	5.1	5.75	5.6
17	4.2	4.1	6.05	5.3	5.85	4.75	4.0	3.4	3.4	5.1	5.7	5.5
18	4.6	4.3	6.65	5.15	5.75	4.55	4.15	3.25	3.55	4.8	5.4	5.5
19	4.8	4.3	6.65	5.25	5.55	4.5	4.05	3.35	3.5	4.6	5.5	5.2
20	4.7	4.25	5.75	5.1	5.25	4.65	3.95	3.35	3.6	4.6	5.4	5.2
21	6.0	4.2	5.55	5.05	5.05	4.55	3.95	3.15	3.25	5.0	5.3	5.2
22	5.0	4.2	5.75	4.95	4.95	4.4	3.95	3.15	3.2	4.7	5.5	4.7
23	4.8	3.9	5.7	4.85	5.05	4.35	3.75	3.25	3.4	4.8	5.25	5.0
24	4.5	4.2	6.25	5.25	4.75	4.25	3.95	3.4	7.2	4.7	5.2	6.8
25	4.6	4.1	6.15	5.55	4.7	4.05	3.95	3.35	5.9	4.6	5.5	6.7
26	4.5	4.1	5.75	5.55	4.55	4.15	3.95	3.35	5.3	4.45	5.5	6.4
27	4.4	4.1	5.7	5.35	4.85	4.15	3.75	3.35	4.7	4.5	5.35	6.4
28	4.3	4.1	5.65	5.25	5.25	4.15	3.75	3.25	4.55	6.75	5.1	6.2
29	4.3	.....	5.55	5.15	5.25	4.15	3.75	3.05	4.9	10.2	5.2	5.9
30	4.4	.....	5.75	4.95	5.05	4.15	3.75	3.15	5.9	10.65	5.2	5.8
31	4.2	.....	5.75	.....	4.75	.....	3.6	3.25	.....	9.9	.....	6.2

[a] River did not freeze over near gage during 1907. The discharge may have been slightly affected during short periods during January, February, and March.

Daily gage height, in feet, of Housatonic River at Gaylordsville, Conn., for 1907–8—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.[a]												
1	6.5	4.4	4.9	6.35	5.65	4.75	3.65	3.65	3.4	3.2	2.95	3.0
2	6.2	4.9	4.9	5.95	5.65	4.85	3.85	3.45	3.3	3.1	3.0	3.0
3	5.8	4.7	5.0	5.65	5.75	4.85	4.15	3.55	3.3	3.2	3.1	3.1
4	5.6	4.5	4.9	5.35	5.85	4.45	4.25	3.15	3.3	2.8	3.1	3.1
5	5.2	4.5	4.8	5.25	5.25	4.45	3.95	3.25	3.3	3.0	3.2	2.9
6	4.7	4.5	4.8	5.35	5.15	4.25	3.95	3.35	2.9	3.1	3.2	2.7
7	4.9	4.6	4.8	5.15	5.15	4.05	3.65	4.25	3.1	3.2	2.9	3.0
8	5.9	4.5	4.9	5.15	5.75	3.95	3.75	4.25	3.0	2.9	2.55	3.3
9	5.6	4.3	4.9	6.15	6.25	3.75	3.85	4.15	3.2	3.4	2.9	3.6
10	5.4	4.4	4.7	6.15	6.45	3.95	3.65	3.95	3.1	3.1	2.9	3.7
11	5.0	4.3	4.7	6.35	6.25	4.05	3.55	3.75	3.0	2.9	3.1	3.5
12	5.4	4.5	5.1	5.75	5.95	3.95	3.35	3.95	3.0	3.2	2.9	3.5
13	6.9	4.5	5.8	5.35	5.65	3.95	3.45	3.85	2.8	3.2	3.1	3.2
14	7.1	4.5	6.1	5.55	5.55	3.75	3.05	3.65	2.9	3.2	2.9	3.5
15	6.3	7.85	6.3	5.25	5.45	3.65	3.25	3.45	2.9	3.0	2.75	3.3
16	6.2	9.4	6.4	5.45	5.45	3.95	3.75	3.0	2.9	3.0	3.1	3.0
17	5.3	7.6	6.4	5.55	5.35	3.95	3.45	3.3	2.9	3.0	2.9	3.3
18	5.3	7.0	6.0	5.45	5.05	4.25	3.55	3.3	2.9	2.6	2.8	3.4
19	5.3	6.4	5.9	5.35	4.95	4.15	3.35	3.3	2.9	2.7	3.1	3.5
20	5.0	5.9	6.4	5.35	4.95	3.85	3.35	3.3	2.8	3.0	2.8	3.0
21	5.1	5.2	5.5	5.35	4.95	3.55	3.35	3.6	3.0	3.0	2.9	3.5
22	5.0	5.0	5.5	5.35	4.85	3.35	3.45	3.5	3.0	2.7	2.75	3.6
23	5.0	4.8	5.5	5.25	4.95	3.35	3.75	3.3	2.9	2.8	3.0	3.3
24	4.8	4.8	5.9	5.15	4.75	3.45	3.75	3.4	2.9	2.8	2.7	3.3
25	4.7	4.7	6.2	5.15	4.75	3.65	3.75	3.0	3.0	2.7	2.8	2.6
26	4.7	4.7	6.2	4.85	4.85	4.75	4.25	3.3	3.0	2.8	3.0	2.9
27	5.2	6.0	6.3	4.85	4.25	4.15	4.35	3.5	2.55	3.0	3.1	2.8
28	5.2	5.7	6.2	4.95	4.15	3.95	3.75	3.6	2.8	3.1	3.3	3.0
29	5.2	4.9	6.2	4.95	4.05	3.75	3.65	3.5	3.0	3.1	3.1	3.2
30	4.4	.....	6.2	5.05	4.15	3.65	3.65	3.5	3.0	3.1	2.8	3.4
31	4.3	.....	6.2	.....	4.55	.....	3.55	3.1	.....	3.3	.....	3.1

[a] River did not freeze over near the gage during 1908.

Rating table for Housatonic River at Gaylordsville, Conn., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.50	114	3.80	747	5.10	2,200	6.80	5,690
2.60	147	3.90	816	5.20	2,360	7.00	6,180
2.70	182	4.00	890	5.30	2,520	7.20	6,690
2.80	220	4.10	970	5.40	2,690	7.40	7,210
2.90	261	4.20	1,060	5.50	2,870	7.60	7,730
3.00	305	4.30	1,160	5.60	3,060	7.80	8,260
3.10	352	4.40	1,260	5.70	3,250	8.00	8,800
3.20	401	4.50	1,370	5.80	3,450	8.20	9,340
3.30	452	4.60	1,490	5.90	3,650	8.40	9,880
3.40	505	4.70	1,620	6.00	3,860	8.60	10,420
3.50	561	4.80	1,760	6.20	4,300	8.80	10,960
3.60	620	4.90	1,900	6.40	4,750	9.00	11,500
3.70	682	5.00	2,050	6.60	5,210	10.00	14,300
						11.00	17,150

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1900–1908, and it is well defined.

Monthly discharge of Housatonic River at Gaylordsville, Conn., for 1907–8.

[Drainage area, 1,020 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches, on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	3,970	1,060	2,080	2.04	2.35	B.
February	1,370	816	1,120	1.10	1.14	B.
March	5,330	714	2,430	2.38	2.74	B.
April	3,350	1,830	2,340	2.29	2.56	B.
May	3,550	1,430	2,010	1.97	2.27	B.
June	4,860	930	2,160	2.12	2.36	B.
July	1,560	620	921	.903	1.04	B.
August	651	328	493	.483	.56	B.
September	6,690	240	1,210	1.19	1.33	B.
October	16,100	1,320	3,700	3.63	4.18	B.
November	11,200	2,200	4,950	4.85	5.41	B.
December	5,690	1,260	3,120	3.06	3.53	B.
The year	16,100	240	2,210	2.17	29.47	
1908.						
January	6,430	1,160	2,820	2.76	3.18	B.
February	12,600	1,160	2,860	2.80	3.02	B.
March	4,750	1,620	3,180	3.12	3.60	B.
April	4,640	1,830	2,790	2.74	3.06	B.
May	4,860	930	2,510	2.46	2.84	B.
June	1,830	478	958	.939	1.05	B.
July	1,210	328	687	.674	.78	B.
August	1,110	305	592	.580	.67	B.
September	505	130	310	.304	.34	B.
October	505	147	313	.307	.35	B.
November	452	130	290	.284	.32	B.
December	682	147	411	.403	.46	B.
The year	12,600	130	1,480	1.45	19.67	

HUDSON RIVER DRAINAGE BASIN.

DESCRIPTION.

The principal sources of Hudson River lie in the wildest portion of the Adirondack Mountains, in Essex County, northeastern New York. A number of branches, any one of which might possibly be considered the main stream, form its upper waters; but if the highest collected and permanent body of water be assumed as the true head, then the source of the Hudson becomes Lake Tear-of-the-Clouds, which lies at an elevation of 4,322 feet above tide, in the center of the triangle by Mount Marcy and Skylight and Gray Peaks.

The river flows rather irregularly southward until it reaches the northern boundary of Saratoga County, where it makes a sharp turn and flows eastward for about 12 miles, passing through the mountains and forming, as it cuts across the rocky strata, several falls of great height and beauty. At Sandy Hill, just below Glens Falls, it makes another abrupt turn and flows southward, continuing in this direction until it empties into New York Bay.

From Lake Tear-of-the-Clouds to the mouth of the river the distance by water is probably about 300 miles. The total area drained is 13,366 square miles. The river is tidal to Troy, which is also at the head of navigation.

The headwater region is mountainous in character, is in general heavily wooded, and is dotted with numerous lakes and ponds. The rocks, belonging to the oldest formation and mainly granitic, are either bare or covered only with a layer of spruce duff, humus, and forest litter. The river emerges from the mountain region a few miles west of Glens Falls, and thence to Troy the topography is moderately rolling and the surface soil is chiefly sand. Below Troy the river follows the great depression which extends almost due north and south between New York Bay and the St. Lawrence, flowing in an open valley bordered by well-cultivated lands, which rise with moderate slope from the stream. The Catskill Mountain region is reached 20 or 30 miles below Albany, and thence to the mouth of the river the immediate valley is flanked by high hills, the Highlands of Orange County and the precipitous Palisades being especially noticeable.

The fall in the upper portion of the course is very rapid, amounting to about 64 feet per mile from Lake Tear-of-the-Clouds to the mouth of North Creek, a distance of about 52 miles. From the mouth of North Creek to the mouth of the Sacandaga the descent is nearly 14 feet per mile, distributed among rapids which diminish in frequency as the Sacandaga is approached. In the succeeding 26 miles to Fort Edward the river descends 418 feet more, but of this 175 feet is comprised within the three abrupt pitches at Palmer, Glens, and Bakers Falls, while most of the remainder occurs in the rapids between Jessups Landing and the oxbow above Glens Falls. Between Glens Falls and Troy nearly the entire fall of the river is utilized for the development of water power.

The tributaries of the Hudson are numerous, and many of them are large and important. Indian River, Schroon River, and the Sacandaga unite with the main stream above Glens Falls, and between the latter point and Troy it receives Battenkill River, Fish Creek, Hoosic River, and the Mohawk, the latter having several important tributaries, including West and East Canada and Schoharie creeks. The tributaries below Troy include Catskill, Esopus, and Rondout creeks, and Wallkill River from the west, and Kinderhook Creek, Jansen Kill, Wappinger Creek, Fishkill Creek, and Groton River from the east.

The mean annual precipitation on the total basin of the Hudson is probably about 43 inches. It reaches a maximum of more than 55 inches in the heights of the Adirondacks, while in the eastern portion of the drainage area in southern Vermont, the mean annual total is only about 39 inches. Conditions during the winter period vary from the extreme cold and deep snow of the Adirondacks to the areas in the southern portion of the basin which are subject to frequent winter thaws.

The flow of the upper Hudson is controlled to some extent during the dry season by the use of Indian Lake storage reservoir, and the natural storage facilities in the Adirondack region are unsurpassed, there being a great many ponds and lakes, many of large size and fed from extensive drainage areas. Comprehensive plans for vast storage projects on the Sacandaga, Schroon, and Upper Hudson are receiving the attention of the New York State Water Supply Commission. It is probable that on the various tributaries of the Hudson an increase in storage capacity of some 75 billion cubic feet is possible, and if this were developed the Hudson would be probably the most important water-power stream in the country. While a large amount of power has been developed in the Hudson drainage area there are vast quantities as yet unutilized, and the importance of this river basin is apparent, when it is considered that in proportion to its size it contains a greater population than any other important drainage basin in the United States with the single exception of that of the Delaware River.

The longest run-off record in the Hudson River drainage basin is that obtained at Mechanicville, which extends back to 1888.

The following gaging stations, all included in the State of New York, have been maintained in this river basin, and records obtained at them have appeared in the publications of the United States Geological Survey:

Hudson River at North Creek (1907–8).
Hudson River at Thurman (1907–8).
Hudson River at Fort Edward (1895–1908).
Hudson River at Mechanicville (1888–1908).
Indian Lake Reservoir at Indian Lake (1900–1908).
Schroon Lake at Pottersville (1908).
Schroon River at Riverbank (1907–8).
Schroon River at Warrensburg (1895–1902).
Sacandaga River at Wells (1907–8).
Sacandaga River at Northville (1907–8).
Sacandaga River near Hadley (1907–8).
Battenkill River at Battenville (1908).
Fish Creek at Burgoyne (1904–5 and 1908).
Hoosic River at Buskirk (1903–1908).
Mohawk River at Ridge Mills near Rome (1898–1900).
Mohawk River at Utica (1901–1903).
Mohawk River at Little Falls (1898–1908).
Mohawk River at Rocky Rift Dam near Indian Castle (1901).
Mohawk River at Schenectady (1899–1901).
Mohawk River at Rexford Flats (1898–1901).
Mohawk River at Dunsbach Ferry (1898–1908).
Ninemile Creek at Stittville (1898–99).
Oriskany Creek at Coleman (1904–1906).
Oriskany Creek at Wood Road Bridge near Oriskany (1901–1904).
Oriskany Creek at Oriskany State Dam near Oriskany (1898–1906).
Sanquoit Creek at New York Mills (1898–1900).

Nail Creek at Utica (1904).
Reels Creek at Deerfield (1901–1904).
Reels Creek at Utica (1901–2).
Johnston Brook at Deerfield (1903–1905).
Starch Factory Creek at New Hartford (1903–1906).
Graefenberg Creek at New Hartford (1903–1906).
Sylvan Glen Creek at New Hartford (1900–1906).
West Canada Creek at Twin Rock Bridge near Trenton Falls (1900–1908).
West Canada Creek at Middleville (1898–1901).
West Canada Creek at Kast Bridge (1905–1908).
East Canada Creek at Dolgeville (1898–1908).
Garoga Creek 3 miles above junction with Mohawk (1898–99).
Cayadutta Creek at Johnstown (1898–1900).
Schoharie Creek at Prattsville (1902–1908).
Schoharie Creek at Schoharie Falls above Mill Point (1900–1901).
Schoharie Creek at Mill Point (1900–1903).
Schoharie Creek at Fort Hunter (1898–1901).
Schoharie Creek at Erie Canal Aqueduct below Fort Hunter (1900).
Quackenkill at Quackenkill (1894).
Normanskill at French's Mill (1891).
Kinderhook Creek at Wilson's Dam near Garfield (1893–1894).
Kinderhook Creek at East Nassau (1892–1894).
Kinderhook Creek at Rossman (1906–1908).
Catskill Creek at South Cairo (1901–1907).
Esopus Creek at Olivebridge (1903–1904).
Esopus Creek at Kingston (1901–1908).
Rondout Creek at Rosendale (1901–1903, 1905–1908).
Diversion to Delaware and Hudson Canal at Rosendale (1901–1907).
Wallkill River at Newpaltz (1901–1903).
Wappinger Creek at Wappinger Falls (1903–1905).
Foundry Brook at Coldspring (1902–3).
Fishkill Creek at Glenham (1901–1903).
Croton River at Croton Dam near Croton Lake (1868–1903).

STATIONS ON MAIN STREAM.

HUDSON RIVER AT NORTH CREEK, N. Y.

This station is located on the steel highway bridge at North Creek. It was established, in cooperation with the New York state water-supply commission, September 21, 1907, to obtain general statistical and comparative data in regard to the flow of the Hudson.

North Creek, a small tributary of the Hudson, enters from the right a short distance below this point.

The gage datum has remained the same during the maintenance of the station. During the winter months the discharge is affected by the presence of ice. Conditions for obtaining the accurate discharge are good, and a very good rating curve has been developed.

The regimen of flow of the upper Hudson, especially during the low-water season, has been considerably affected by storage in Indian Lake reservoir. (See Indian Lake at Indian Lake.)

Information in regard to this station is contained in the annual reports of the state water-supply commission of New York.

Discharge measurements of Hudson River at North Creek, N. Y., 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. feet.*	*Feet.*	*Sec.-ft.*
August 29	Barrows and Hoyt	235	547	2.91	788
August 31	W. G. Hoyt	235	502	2.90	716
September 20	do	237	506	2.71	618
September 21	Pierson and Hoyt	236	462	2.55	512
October 1	J. B. Pierson	250	834	4.09	2,380
October 24	do	239	547	2.96	890
November 12	do	250	937	4.52	3,290
November 16	do	143	673	3.43	1,560
1908.					
January 22	Wood and Pierson	240	523	2.99	810
July 7	G. M. Brett	243	576	3.06	990
August 7	Brett and Allen	241	534	2.87	775
September 18	D. M. Wood	236	453	2.54	469

Daily gage height, in feet, of Hudson River at North Creek, N. Y., for 1907–8.

[Gilbert Dean, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1			4.67	3.88	2.80	16			3.50	3.55	4.00
2			4.40	3.65	2.79	17			3.37	3.50	3.88
3			3.52	4.80	2.72	18			3.20	3.28	3.75
4			3.30	5.35	2.62	19			3.14	3.20	3.59
5			3.52	4.90	2.62	20		2.71	3.07	3.17	3.48
6			3.50	4.58	2.72	21		2.55	3.26	3.09	3.38
7			3.48	6.58	2.76	22		2.72	3.22	3.09	3.40
8			4.35	6.55	2.82	23		3.22	3.12	3.15	3.57
9			5.32	5.96	2.75	24		3.25	2.94	3.15	4.45
10			5.30	5.28	3.12	25		3.30	3.04	3.15	4.55
11			5.60	4.88	5.12	26		3.24	3.25	3.12	4.48
12			4.65	4.50	5.07	27		3.25	3.07	3.07	4.30
13			4.22	4.18	4.68	28		3.20	3.85	3.04	4.18
14			4.07	3.94	4.35	29	2.91	3.32	4.62	3.00	4.38
15			3.75	3.75	4.00	30		3.60	5.00	2.85	4.38
						31	2.90		3.74		4.62

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	4.48	2.99	3.45	5.37	7.54	3.70	2.60	3.01	2.68	2.69	2.73	2.95
2	4.37	2.99	3.64	4.96	7.46	3.63	2.49	2.94	2.66	2.69	2.65	2.87
3	4.24	3.07	3.66	4.51	7.08	3.57	2.45	2.86	2.65	2.66	2.58	2.73
4	4.06	3.24	3.56	4.24	6.81	3.40	2.96	2.84	2.63	2.66	2.56	2.73
5	3.79	3.49	3.53	3.99	6.01	3.22	3.04	2.93	2.62	2.63	2.56	2.69
6	3.77	3.51	3.48	3.99	6.26	3.03	3.00	2.85	2.62	2.61	2.55	2.55
7	3.71	3.54	4.00	4.42	5.14	2.93	3.01	2.89	2.63	2.61	2.48	2.66
8	3.51	3.56	3.94	5.05	5.98	2.83	3.02	2.86	2.61	2.59	2.47	2.74
9	3.43	3.59	3.90	5.54	5.74	2.78	3.06	2.86	2.61	2.58	2.47	2.69
10	3.32	3.61	3.98	5.51	6.24	2.74	2.92	2.84	2.61	2.57	2.49	2.51
11	3.24	3.69	3.93	5.70	5.55	2.70	2.82	2.82	2.61	2.62	2.53	2.55
12	3.29	3.69	3.90	5.65	5.31	2.70	2.97	2.82	2.60	2.62	2.63	2.73
13	3.29	3.67	3.90	5.19	6.44	2.99	2.95	2.87	2.59	2.61	2.68	2.71
14	3.19	3.63	3.93	4.85	6.78	3.55	2.96	2.87	2.57	2.60	2.66	2.69
15	3.11	3.77	4.11	4.67	6.11	2.85	2.93	2.86	2.56	2.57	2.86	2.66
16	3.07	4.33	4.38	4.63	5.91	2.75	2.89	2.81	2.56	2.55	3.16	2.71
17	3.04	4.78	4.46	5.07	5.46	2.73	2.91	2.82	2.55	2.55	2.76	2.81
18	3.04	4.97	4.40	4.47	3.98	2.61	3.09	2.92	2.55	2.55	2.70	2.97
19	3.02	4.91	4.30	4.69	5.08	2.54	3.32	2.96	2.55	2.55	2.63	3.09
20	2.99	4.75	4.28	4.60	4.95	2.63	3.53	2.99	2.54	2.52	2.54	2.93

Daily gage height, in feet, of Hudson River at North Creek, N. Y., for 1907–8—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	2.98	4.56	4.17	4.35	5.08	2.90	3.36	2.98	2.53	2.51	2.55	2.84
22	2.97	4.30	4.07	4.22	4.21	2.96	2.88	2.91	2.53	2.51	2.47	2.83
23	2.99	4.11	4.06	4.34	5.91	2.75	2.63	2.81	2.53	2.51	2.51	2.81
24	2.99	3.93	4.12	5.13	4.68	2.65	2.53	2.79	2.53	2.48	2.49	2.80
25	2.99	3.78	4.27	5.85	4.31	2.65	2.43	2.76	2.53	2.46	2.53	2.83
26	2.99	3.63	4.23	7.37	4.01	2.59	2.64	2.76	2.53	2.48	2.76	2.73
27	2.96	3.57	4.58	8.49	3.91	2.49	3.03	2.73	2.51	2.63	3.14	2.71
28	2.89	3.52	5.20	8.59	3.94	2.47	3.04	2.72	2.51	2.68	3.36	2.69
29	2.89	3.50	6.06	8.49	3.70	2.63	3.03	2.72	2.66	2.72	3.21	2.72
30	2.91	.....	6.03	7.37	3.54	2.69	3.02	2.69	2.81	2.76	3.11	2.83
31	2.96	.....	5.73	.....	3.54	.....	3.00	2.69	.....	2.76	.....	2.81

NOTE.—River did not freeze over during January to March, 1908, but conditions of flow may have been somewhat affected during this period by ice obstruction. River frozen December 15 to 31, 1908.

Rating table for Hudson River at North Creek, N. Y., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*
2.40	400	3.70	1,770	5.00	4,090	6.60	8,050
2.50	460	3.80	1,920	5.10	4,300	6.80	8,620
2.60	530	3.90	2,080	5.20	4,520	7.00	9,200
2.70	610	4.00	2,240	5.30	4,740	7.20	9,790
2.80	700	4.10	2,400	5.40	4,970	7.40	10,390
2.90	790	4.20	2,570	5.50	5,200	7.60	11,010
3.00	890	4.30	2,740	5.60	5,440	7.80	11,630
3.10	990	4.40	2,920	5.70	5,680	8.00	12,270
3.20	1,100	4.50	3,100	5.80	5,930	8.20	12,910
3.30	1,220	4.60	3,290	5.90	6,180	8.40	13,550
3.40	1,350	4.70	3,480	6.00	6,430	8.60	14,210
3.50	1,480	4.80	3,680	6.20	6,950	8.80	14,870
3.60	1,620	4.90	3,880	6.40	7,490	9.00	15,530

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 18 discharge measurements made during 1907–8, and is well defined. Owing to the availability of more recent data, the above table has been revised and differs slightly from that published in the Fourth Annual Report of the state water-supply commission of New York.

Monthly discharge of Hudson River at North Creek, N. Y., for 1907–8.

[Drainage area, 804 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
September 20 to 30	1,620	495	1,050	1.31	0.54	A.
October	5,440	830	2,120	2.64	3.04	A.
November	7,990	745	2,530	3.15	3.51	A.
December	4,340	546	1,970	2.45	2.82	A.
1908.						
January	3,060	781	1,300	1.62	1.87	C.
February	4,030	880	2,020	2.51	2.71	C.
March	6,590	1,420	2,730	3.40	3.92	C.
April	14,200	2,220	5,270	6.55	7.31	A.
May	10,800	1,540	5,230	6.50	7.49	A.
June	1,770	442	818	1.02	1.14	A.
July	1,520	418	830	1.03	1.19	A.
August	900	602	742	.923	1.06	A.
September	709	467	525	.653	.73	A.
October	664	436	532	.662	.76	A.
November	1,300	442	626	.779	.87	A.
December	851	360	570	.709	.82	C
The year	14,200	360	1,770	2.20	29.87	

NOTE.—Discharge December 15 to 31, 1908, 533 second-feet; based on measurement made under ice conditions January 1, 1909. (See rating table footnote.)

HUDSON RIVER AT THURMAN, N. Y.

This station is located on the Delaware and Hudson Railroad bridge leading from Thurman to Warrensburg, about 950 feet below the highway bridge to Warrensburg, and some 2,000 feet below the entrance of Schroon River into the Hudson. It was established, in cooperation with the New York state water-supply commission, September 22, 1907, to obtain general statistical and comparative data regarding the flow of the Hudson River.

There is a dam on Schroon River at Warrensburg, about 3 miles above the station. On the Hudson there is a dam at Luzerne about 12 miles below. During the winter months the discharge is affected by ice, and the station discontinued.

The datum of the chain gage has remained the same during the maintenance of the station. Conditions for obtaining accurate discharge data are excellent, and a very good rating curve has been developed.

The regimen of flow of the upper Hudson, especially during the low-water season, has been considerably affected by storage in Indian Lake reservoir. (See Indian Lake at Indian Lake.)

Information in regard to this station is contained in the annual reports of the state water-supply commission of New York.

Discharge measurements of Hudson River at Thurman, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 28	Barrows and Hoyt	260	757	2.86	1,150
August 31	do	251	683	2.49	832
September 1	do	253	662	2.46	777
September 22	W. G. Hoyt	230	550	2.05	476
September 30	J. B. Pierson	275	962	3.48	2,640
Do	do	275	960	3.47	2,700
October 15	do	277	963	3.52	2,800
October 26	do	260	769	2.75	1,400
November 4	do	299	1,460	4.98	6,760
November 13	do	301	1,280	4.54	5,790
November 18	do	280	991	3.58	2,970
December 12	do	292	1,270	4.60	6,340
1908.					
June 23	D. M. Wood	272	846	3.03	1,600
July 4	G. M. Brett	272	863	3.07	1,510
August 6	Brett and Allen	262	698	2.46	860
Do	do	262	694	2.49	835
September 19	D. M. Wood	247	623	2.25	609

Daily gage height, in feet, of Hudson River at Thurman, N. Y., for 1907–8.

[S. H. Spencer, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	2.41	3.80	3.71	3.12	16	.....	3.30	3.30	3.86	4.11
2	.....	2.47	3.96	3.58	3.10	17	.....	2.75	3.21	3.74	3.90
3	.....	2.60	3.28	4.07	3.09	18	.....	2.54	3.10	3.58	3.75
4	.....	2.95	3.18	4.95	3.06	19	.....	2.44	3.00	3.43	3.65
5	.....	3.55	3.22	4.71	3.05	20	.....	2.41	3.03	3.32	3.60
6	.....	3.42	3.16	4.66	3.03	21	.....	2.24	3.09	3.35	3.52
7	.....	3.14	3.18	6.41	3.02	22	.....	2.21	3.13	3.36	3.43
8	.....	2.80	3.71	6.33	3.01	23	.....	2.62	2.97	3.35	3.50
9	.....	2.79	4.61	5.98	3.01	24	.....	2.88	2.88	3.31	4.55
10	.....	2.59	4.61	5.73	3.69	25	.....	2.87	2.86	3.29	4.57
11	.....	2.43	5.16	5.16	4.65	26	.....	2.89	2.94	3.29	4.50
12	.....	3.43	4.15	4.82	4.36	27	.....	2.81	3.00	3.26	4.40
13	.....	3.75	3.97	4.58	4.12	28	2.86	2.78	3.72	3.18	4.33
14	.....	3.54	3.67	4.33	4.03	29	.....	3.00	4.44	3.17	4.38
15	.....	3.22	3.48	4.06	3.90	30	.....	3.37	4.24	3.16	4.45
						31	2.49	.....	3.98	.....	4.70

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	4.45	6.01	.....	5.65	7.41	3.73	2.76	2.65	2.36	2.45	2.40	2.85
2	4.44	6.19	.....	5.45	6.87	3.69	2.84	2.51	2.50	2.39	2.45	2.67
3	4.29	6.31	.....	5.05	6.57	3.63	2.86	2.53	2.45	2.49	2.34	2.61
4	4.06	6.45	.....	4.85	6.42	3.47	3.08	2.63	2.32	2.53	2.39	2.44
5	3.83	6.47	.....	4.71	6.09	3.34	3.01	2.56	2.26	2.43	2.33	2.58
6	3.67	6.62	.....	4.59	5.94	3.35	3.04	2.46	2.48	2.39	2.41	2.63
7	3.75	.....	.....	4.84	5.41	3.19	3.02	2.53	2.49	2.39	2.30	.....
8	3.90	.....	.....	5.42	6.19	2.95	3.14	2.54	2.34	2.35	2.42	.....
9	4.19	.....	.....	5.93	5.87	2.93	3.06	2.56	2.34	2.40	2.28	.....
10	7.46	.....	.....	5.86	5.67	3.13	2.95	2.55	2.39	2.41	2.38	.....
11	8.21	.....	.....	5.99	5.45	2.91	2.86	2.52	2.29	2.47	2.37	.....
12	8.16	.....	.....	6.03	5.77	2.81	2.83	2.62	2.38	2.31	2.33	.....
13	8.05	.....	.....	5.90	6.07	3.07	2.88	2.66	2.22	2.36	2.40	.....
14	7.50	.....	.....	5.55	6.23	2.93	2.83	2.54	2.33	2.36	2.53	.....
15	7.41	.....	.....	5.32	6.34	2.87	2.85	2.58	2.43	2.39	2.95	.....
16	6.85	.....	.....	5.25	6.14	2.82	2.80	2.46	2.35	2.32	2.73	.....
17	6.66	.....	.....	5.09	5.47	2.85	2.87	2.69	2.40	2.36	2.59	.....
18	6.63	.....	.....	4.99	4.79	2.78	2.95	2.62	2.35	2.41	2.46	.....
19	6.72	.....	.....	5.12	4.59	2.73	2.91	2.74	2.24	2.32	2.37	.....
20	6.08	.....	.....	5.02	4.91	2.80	3.35	2.59	2.26	2.35	2.38	.....
21	6.21	.....	.....	4.75	4.57	2.86	3.18	2.62	2.35	2.26	2.38	.....
22	6.04	.....	.....	4.61	4.31	3.01	2.89	2.63	2.32	2.30	2.29	.....
23	6.13	.....	.....	4.59	5.29	2.97	2.46	2.55	2.39	2.24	2.33	.....
24	5.79	.....	.....	4.95	4.81	2.90	2.44	2.44	2.38	2.21	2.37	.....
25	5.84	.....	5.13	5.48	4.27	2.81	2.43	2.57	2.35	2.14	2.46	.....
26	5.71	.....	4.79	5.74	4.20	2.81	2.19	2.46	2.41	2.30	2.48	.....
27	5.61	.....	5.15	7.50	4.02	2.76	2.78	2.43	2.17	2.72	2.82	.....
28	5.46	.....	5.38	7.47	3.98	2.57	2.77	2.43	2.34	2.66	3.18	.....
29	5.82	.....	5.86	7.47	3.77	2.60	2.67	2.51	2.59	2.62	3.03	.....
30	5.48	.....	5.76	6.83	3.64	2.62	2.81	2.47	2.40	2.66	2.94	.....
31	5.82	.....	5.90	.....	3.73	.....	2.70	2.45	.....	2.58	.....	.....

NOTE.—River frozen January 10 to March 24 and December 7 to 31, 1908. Observations discontinued December 7 on account of poor winter conditions caused by anchor ice packing at the bridge.

Rating table for Hudson River at Thurman, N. Y., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.10	500	3.20	2,070	4.30	4,860	5.80	9,320
2.20	575	3.30	2,290	4.40	5,150	6.00	9,920
2.30	660	3.40	2,520	4.50	5,440	6.20	10,520
2.40	760	3.50	2,750	4.60	5,730	6.40	11,120
2.50	875	3.60	2,990	4.70	6,020	6.60	11,720
2.60	1,000	3.70	3,230	4.80	6,320	6.80	12,320
2.70	1,140	3.80	3,480	4.90	6,620	7.00	12,920
2.80	1,295	3.90	3,740	5.00	6,920	7.20	13,520
2.90	1,470	4.00	4,010	5.20	7,520	7.40	14,120
3.00	1,660	4.10	4,290	5.40	8,120	7.60	14,720
3.10	1,860	4.20	4,570	5.60	8,720		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 18 discharge measurements made during 1907–8, and is well defined between gage heights 2 feet and 5 feet. The above table has been revised and differs slightly from that published in the Fourth Annual Report of the state water-supply commission of New York on the basis of additional data more recently available.

Monthly discharge of Hudson River at Thurman, N. Y., for 1907–8.

[Drainage area, 1,550 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
September	3,360	584	1,520	0.981	1.09	A.
October	7,400	1,400	2,980	1.92	2.21	A.
November	11,200	1,990	4,530	2.92	3.26	A.
December	6,020	1,680	3,580	2.31	2.66	A.
January	5,300	.....	2,620	1.69	1.95	C.
February	.....	.....	3,630	2.34	2.52	C.
March	9,620	.....	4,750	3.06	3.53	C.
April	14,400	5,700	8,520	5.50	6.14	A.
May	14,200	3,090	7,900	5.10	5.88	A.
June	3,300	962	1,700	1.10	1.23	A.
July	2,400	568	1,410	.910	1.05	A.
August	1,200	794	943	.608	.70	A.
September	988	552	728	.470	.52	A.
October	1,170	530	779	.503	.58	A.
November	2,030	643	919	.593	.66	A.
December	.....	.....	900	.581	.67	C.
The year	14,400	530	2,900	1.87	25.43	

NOTE.—Discharge during the frozen periods, January to March and December, 1908, estimated on the basis of the combined discharge of Hudson River at North Creek and Schroon River at Riverbank.

	Sec.-ft.
Discharge January 10 to 31	1,970
March 1 to 24	3,750
December 7 to 31	864

See rating table footnote.

HUDSON RIVER AT FORT EDWARD, N. Y.

This station is located at the dam of the International Paper Company at Fort Edward and was established in 1895 by the state engineer department in connection with the upper Hudson storage surveys. In 1899 it was taken over by the United States Geological Survey, and since 1907 it has been maintained by the state engineer department, which has furnished the records for 1907 and 1908.

The dam is of frame timber on a slate-rock foundation and leaks but little. The crest is straight and fairly level, and is about 588 feet long. Flashboards 15 to 18 inches high are usually maintained, and the record of flow is computed by the usual methods, taking into account the flow over the dam or flashboards and through the wheels, of which there are about 62 in the adjoining mill.

Conditions for obtaining accurate discharge data are not very good owing to the complicated conditions, and the results are considered to be only fair.

In the navigation season water is diverted from the Hudson at the Glens Falls feeder dam 7 miles above Fort Edward and supplied by the Champlain Canal. (See Champlain Canal and Glens Falls feeder, pp. 185 to 188.)

Information in regard to this station is contained in the annual reports of the state engineer and surveyor, State of New York.

Daily discharge in second-feet of Hudson River at Fort Edward, N. Y., for 1906-1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.[a]												
1	5,402	7,210	5,542	[b]6,673	9,696	8,717	[b]4,027	3,380	1,689	2,315	3,004	1,933
2	4,901	3,934	5,000	7,339	10,227	5,745	8,925	2,346	[b]1,132	2,252	3,129	[b]2,490
3	4,387	3,234	3,021	7,092	11,078	[b]6,069	7,572	2,941	1,887	2,252	1,329	3,693
4	4,386	[b]2,692	[b]7,412	7,407	10,755	7,117	4,792	1,444	2,378	2,315	[b]1,414	3,693
5	4,466	4,843	9,676	8,565	10,472	5,489	7,061	[b]854	1,877	2,127	2,503	2,366
6	2,666	4,048	8,289	8,117	[b]9,987	4,773	6,023	3,192	3,442	1,345	2,190	2,521
7	[b]4,957	3,876	7,763	6,649	10,229	5,054	3,053	3,067	3,129	[b]1,172	2,440	3,442
8	4,627	3,939	7,171	[b]6,080	9,379	5,293	[b]3,569	2,816	1,689	2,127	2,378	3,255
9	3,714	3,939	6,706	7,407	10,016	4,595	5,046	2,503	[b]1,296	2,252	2,252	[b]750
10	3,459	1,674	5,059	6,520	9,166	[b]6,716	4,589	2,378	2,879	2,127	1,230	2,850
11	3,154	[b]2,444	[b]4,276	5,747	8,902	8,426	4,714	1,099	2,398	2,252	[b]1,296	2,099
12	3,523	4,007	5,513	5,827	7,119	9,752	4,437	[b]324	2,294	2,127	2,378	2,520
13	1,714	3,772	5,031	6,248	[b]6,930	6,786	3,944	2,378	2,242	1,345	2,816	2,396
14	[b]2,444	4,022	4,513	6,995	10,014	6,082	1,621	2,190	2,242	[b]1,049	2,127	2,475
15	4,387	4,064	4,327	[b]15,709	12,065	5,583	[b]2,201	1,512	1,407	2,127	2,566	2,754
16	4,028	3,666	4,144	17,116	9,483	2,208	3,955	1,512	[b]865	2,127	2,879	[b]684
17	4,216	1,329	1,674	20,376	7,668	[b]2,364	3,380	1,512	2,252	2,127	1,459	3,944
18	4,154	[b]3,172	[b]2,146	20,717	8,109	5,961	3,129	703	2,315	2,127	[b]3,093	3,630
19	3,593	3,774	3,897	20,717	7,332	5,641	3,129	[b]1,171	2,252	2,127	3,422	3,505
20	1,599	4,061	3,772	21,507	[b]7,184	5,582	2,143	1,512	2,378	1,345	3,693	3,255
21	[b]2,703	3,584	3,208	19,863	6,953	5,155	870	2,816	2,440	[b]684	4,436	3,380
22	4,815	4,207	3,208	[b]17,950	6,483	5,046	[b]324	2,566	1,230	4,583	4,624	3,255
23	5,154	4,442	3,688	20,126	4,941	2,524	3,004	2,879	[b]1,296	3,881	5,464	[b]2,296
24	9,528	2,789	1,444	18,126	6,073	[b]4,118	2,691	3,067	2,628	3,255	3,847	3,935
25	12,997	[b]3,172	[b]1,765	15,624	6,543	5,953	2,628	1,329	2,503	3,505	[b]3,384	684
26	12,294	5,209	3,020	13,406	6,014	4,906	2,143	[b]324	2,190	3,129	4,994	3,380
27	9,698	5,058	3,563	10,863	[b]7,316	4,687	2,018	3,505	2,378	1,804	5,046	2,336
28	[b]8,958	4,906	4,144	7,219	11,853	4,189	1,099	3,067	2,378	[b]1,766	5,046	2,628
29	8,133	.....	6,389	[b]7,353	11,679	3,818	[b]1,230	2,879	1,459	4,101	5,210	2,816
30	8,304	.....	6,663	8,117	10,227	1,674	3,192	2,628	[b]1,008	3,630	5,228	[b]684
31	6,564	.....	6,201	.....	10,014	.....	3,192	2,941	.....	3,505	.....	3,505

[a] Daily discharges for 1906 are recomputed values which supersede those published in Water Supply Paper 202.

[b] Sundays.

Daily discharge in second-feet of Hudson River at Fort Edward, N. Y., for 1906–1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug	Sept.	Oct.	Nov.	Dec.
1907.												
1	6,164	3,646	2,410	33,973	20,240	5,049	3,900	2,546	a 664	7,514	10,764	a 4,202
2	11,623	3,583	2,142	27,712	21,580	a2,621	3,557	2,145	2,411	10,070	9,462	7,021
3	11,383	a3,401	a2,434	22,862	21,190	5,181	5,021	1,512	2,185	9,089	a11,235	3,834
4	11,928	5,026	1,670	18,185	18,740	4,193	1,485	a 664	2,107	4,147	15,902	3,515
5	14,052	3,223	2,865	16,599	a17,600	4,394	7,470	2,782	3,332	4,278	15,029	3,179
6	a14,624	3,592	2,330	15,830	18,300	4,560	10,868	2,531	8,588	a7,523	14,179	2,413
7	14,742	3,780	2,323	a13,658	18,800	7,763	a6,704	2,295	7,043	9,048	20,241	2,515
8	14,166	3,680	2,325	13,659	16,310	8,307	3,989	2,142	a6,641	6,524	24,928	a 2,396
9	12,716	3,890	2,547	11,768	15,680	a9,092	2,247	1,934	3,869	11,148	22,836	5,759
10	12,588	a4,071	a1,212	11,114	14,730	8,059	2,677	1,512	2,737	12,876	a19,687	3,807
11	11,123	5,232	2,722	9,582	12,730	4,854	1,420	a1,247	3,121	12,568	18,056	14,490
12	10,344	3,407	2,393	9,266	a11,330	3,861	2,382	2,609	2,145	11,736	15,289	16,100
13	a9,062	3,976	3,094	8,996	11,470	3,861	1,180	1,512	8,149	a8,106	12,820	14,480
14	9,016	3,639	2,608	a7,866	9,460	3,861	a 332	1,512	7,217	9,486	10,850	12,278
15	7,328	3,509	1,656	9,027	8,860	3,736	2,608	1,512	a5,561	7,988	9,392	a 8,931
16	7,156	3,123	4,304	8,326	7,740	a5,274	1,602	1,512	6,358	6,564	8,218	11,889
17	4,150	a1,416	a1,886	7,836	8,590	4,940	1,665	1,512	3,047	5,042	a6,875	10,542
18	3,892	4,269	6,297	7,256	10,810	3,235	2,221	a 664	2,734	4,590	7,378	9,684
19	4,003	3,499	4,424	6,468	a6,970	2,859	1,602	1,429	2,083	4,766	5,614	9,235
20	a1,952	3,279	5,575	6,042	8,010	1,857	1,180	1,364	1,848	a4,371	4,830	8,898
21	5,180	3,443	4,930	a6,085	6,910	3,316	a 332	1,417	1,512	5,065	5,086	7,848
22	4,014	3,436	5,680	6,474	6,240	3,808	1,512	1,348	a1,360	3,398	4,964	a 5,473
23	3,980	3,201	6,839	4,952	6,040	a2,808	1,348	1,348	1,410	3,721	5,091	8,296
24	4,080	a2,024	a5,544	8,086	5,620	4,477	1,512	2,032	1,512	3,474	a1,596	11,105
25	4,243	2,026	8,484	13,085	6,530	2,483	1,512	a1,656	1,379	3,109	5,236	10,506
26	3,623	3,593	9,788	14,887	a3,900	2,838	2,608	3,153	3,223	2,734	5,296	14,709
27	a3,736	1,857	10,107	20,783	5,440	2,420	3,047	1,512	2,772	a1,778	5,071	12,222
28	4,902	3,023	14,289	a19,407	6,610	2,861	a 514	1,512	3,557	5,804	4,417	13,756
29	3,391	.....	24,977	21,729	6,840	2,796	3,041	1,512	a1,546	13,609	5,279	a11,050
30	3,174	.....	30,027	22,192	7,060	a1,761	1,809	1,512	5,803	13,799	4,656	14,461
31	3,948	.....	a32,790	.....	6,240	.....	2,295	1,694	.....	13,078	.....	15,612
1908.												
1	9,997	2,440	a2,091	16,142	26,346	6,011	1,806	1,932	684	1,362	a 684	2,574
2	9,554	a1,885	1,864	9,089	26,346	5,249	1,348	a 897	684	1,561	2,768	2,564
3	9,048	3,033	2,530	8,860	a20,998	5,195	1,937	756	684	1,561	1,439	2,298
4	6,381	2,584	2,238	8,631	25,176	4,464	684	747	684	a 897	1,700	2,088
5	a3,590	2,747	1,864	a4,428	24,041	4,276	a 968	756	684	1,561	1,964	2,148
6	6,038	2,956	1,441	7,236	16,786	3,864	2,162	747	a 684	1,391	1,559	a 1,173
7	5,120	3,288	1,441	9,942	15,260	a 684	2,340	827	684	2,194	1,682	2,259
8	4,924	3,106	a1,522	18,321	16,703	3,687	2,695	684	873	1,690	a 684	1,901
9	4,790	a1,621	1,636	18,884	18,383	3,833	2,361	a 684	1,097	1,348	1,453	1,704
10	4,756	3,471	1,978	19,104	a13,240	2,653	2,528	684	1,097	1,348	1,348	1,516
11	4,578	2,775	1,522	20,796	15,874	2,736	2,444	684	1,097	a 684	1,541	2,382
12	a2,522	3,088	1,441	a19,863	12,999	2,663	a 698	698	1,097	1,362	1,348	2,061
13	6,418	3,274	1,522	20,239	13,333	2,110	2,460	827	a 684	1,348	1,348	a 1,669
14	5,026	2,903	2,091	18,049	13,866	a 684	2,206	862	1,097	1,348	1,348	2,361
15	5,026	3,608	a2,991	16,172	13,558	4,000	1,959	713	1,097	2,131	a 684	2,634
16	4,360	a5,940	4,148	15,174	13,333	3,258	1,792	a 713	1,097	2,052	3,206	2,165
17	4,084	10,054	5,044	14,423	a7,668	2,810	1,761	684	1,097	2,017	1,927	1,936
18	3,922	9,628	4,839	13,073	10,294	2,778	1,510	756	1,097	a 684	2,237	2,538
19	a1,781	8,833	4,414	a9,155	9,152	2,474	a 684	747	1,097	1,348	1,633	1,881
20	4,988	8,212	3,541	13,461	9,152	2,580	2,356	827	a 684	1,348	1,548	a 1,044
21	4,295	7,786	3,225	12,565	8,388	a 684	3,045	827	1,087	1,348	1,786	1,891
22	3,672	6,569	a3,061	11,530	8,667	3,655	2,523	756	1,097	1,348	a1,044	1,954
23	4,048	a2,375	3,225	10,715	7,834	2,231	2,377	a 756	1,111	1,348	2,423	1,901
24	3,663	3,590	3,382	11,542	a8,131	2,590	1,792	756	1,111	1,348	1,995	2,121
25	3,035	3,823	4,991	12,486	7,604	2,747	1,792	756	1,097	a 684	2,027	684
26	a1,781	2,829	5,945	a17,650	6,955	2,340	a 684	756	1,097	1,348	1,818	1,756
27	3,965	2,375	6,478	22,240	6,241	2,235	2,043	698	a 698	1,348	2,851	a 1,348
28	3,763	2,375	8,083	24,675	5,927	a 684	946	684	1,097	2,073	3,065	1,348
29	3,671	2,138	a10,942	27,034	5,624	2,590	2,043	684	1,097	2,667	a2,525	1,797
30	3,417	.....	14,935	25,114	5,396	2,329	2,043	a 684	1,097	2,687	3,775	2,058
31	2,796	.....	17,364	.....	a2,879	.....	2,043	684	.....	2,684	.....	1,818

a Sunday.

Monthly discharge of Hudson River at Fort Edward, N. Y., for 1906–1908.

[Drainage area, 2,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile	
1906.					
January	13,000	1,600	5,320	1.90	2.19
February	7,210	1,330	3,820	1.36	1.42
March	9,680	1,440	4,780	1.71	1.97
April	21,500	5,750	11,700	4.18	4.66
May	12,100	4,940	8,840	3.16	3.64
June	9,750	1,670	5,330	1.90	2.12
July	8,920	324	3,540	1.26	1.45
August	3,500	324	2,160	.771	.89
September	3,440	865	2,050	.732	.82
October	4,580	684	2,350	.839	.97
November	5,460	1,230	3,160	1.13	1.26
December	3,940	684	2,680	.957	1.10
The year	21,500	324	4,640	1.66	22.49
1907.					
January	14,700	1,950	7,620	2.72	3.14
February	5,230	1,420	3,420	1.22	1.27
March	32,800	1,210	6,800	2.43	2.80
April	34,000	4,950	13,500	4.82	5.38
May	21,600	3,900	11,200	4.00	4.61
June	9,090	1,760	4,240	1.51	1.68
July	10,900	332	2,700	.964	1.11
August	3,150	664	1,730	.618	.71
September	8,590	664	3,530	1.26	1.41
October	13,800	1,780	7,320	2.61	3.01
November	24,900	1,600	10,300	3.68	4.11
December	16,100	2,400	9,040	3.23	3.72
The year	34,000	332	6,780	2.42	32.95
1908.					
January	10,000	1,780	4,680	1.67	1.92
February	10,100	1,620	4,110	1.47	1.58
March	17,400	1,440	4,250	1.52	1.75
April	27,000	4,430	15,200	5.43	6.06
May	26,300	2,880	12,800	4.57	5.27
June	6,010	684	2,940	1.05	1.17
July	3,040	684	1,870	.668	.77
August	1,930	684	783	.280	.32
September	1,110	684	953	.340	.38
October	2,690	684	1,550	.554	.64
November	3,780	684	1,850	.661	.74
December	2,630	684	1,920	.686	.79
The year	27,000	684	4,410	1.57	21.39

NOTE.—Monthly discharge for 1906 recomputed on account of error in flashboard records. The above values supersede those published in Water Supply Paper No. 202.

HUDSON RIVER AT MECHANICVILLE, N. Y.

This station is located at the dam of the West Virginia Pulp and Paper Company at Mechanicville, a few miles downstream from the entrance of Hoosic River into the Hudson. Records have been kept at this point by this company since 1888, and the results for 1907 and 1908 have been furnished by R. P. Bloss, engineer of the company. The dam at Mechanicville was rebuilt in 1904 and now has a rounded or ogee section. A discharge curve has been calculated, using a coefficient of discharge derived from United States Geological Survey experiments on models of dams of ogee cross section, as published in Water Supply Paper 200.

The discharge of the Hudson at Mechanicville is diminished somewhat by water required in operating the Champlain Canal. (See Champlain Canal and Glens Falls feeder, pp. 185 to 188.)

Records at this station are under careful supervision and are regarded as good.

Information in regard to this station is contained in the annual reports of the state water-supply commission of New York and of the state engineer and surveyor, State of New York.

Daily discharge in second-feet of Hudson River at Mechanicville, N. Y., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	17,960	5,662	3,101	36,672	20,529	7,388	5,216	2,159	[a]3,256	8,072	14,958	[a]5,093
2	15,790	5,440	3,193	31,028	24,326	[a]6,995	5,269	3,100	3,427	7,955	12,403	6,878
3	14,200	[a]4,399	[a]3,200	25,262	21,989	7,869	4,904	3,100	3,280	8,182	[a]13,788	6,300
4	18,330	4,752	3,229	20,501	19,412	7,940	4,935	[a]2,159	3,524	7,746	18,846	5,807
5	18,979	5,129	2,396	19,021	[a]23,231	6,549	5,251	1,991	8,246	8,834	18,063	5,242
6	[a]16,568	4,720	3,092	17,400	21,816	7,177	6,666	2,686	10,255	[a]6,971	16,615	5,039
7	16,429	4,347	3,273	[a]16,666	20,931	7,770	[a]5,583	2,865	8,246	8,194	27,934	4,628
8	16,731	4,484	3,005	16,168	20,410	8,410	5,445	2,654	[a]5,920	8,363	31,848	[a]3,494
9	17,220	4,871	2,936	14,234	18,076	[a]6,593	4,060	2,295	6,996	10,739	29,851	5,011
10	14,022	[a]4,427	[a]2,900	13,659	17,277	7,770	3,326	2,654	5,880	13,889	[a]25,859	8,248
11	13,890	4,456	2,933	12,568	15,111	6,304	3,124	[a]1,875	6,073	13,017	23,938	22,770
12	11,564	4,661	3,147	12,691	[a]13,955	5,739	3,618	1,617	9,383	14,395	19,346	20,394
13	[a]9,836	3,230	3,009	12,761	13,206	5,263	4,983	2,654	6,854	[a]10,296	17,295	16,634
14	9,832	4,435	4,343	[a]12,832	11,145	4,913	[a]2,795	2,008	9,050	11,506	15,421	14,259
15	9,005	4,415	9,263	13,252	12,236	4,948	3,812	1,936	[a]5,583	9,508	13,207	[a]11,025
16	8,884	4,193	8,852	12,001	10,614	[a]5,100	3,062	1,652	7,935	8,363	11,375	13,087
17	5,221	[a]3,954	[a]9,123	11,477	14,118	5,575	2,952	1,738	7,111	7,548	[a]9,031	11,785
18	5,811	4,017	9,293	10,651	13,933	4,935	3,740	[a]1,306	5,663	6,809	10,254	10,846
19	6,240	4,219	9,247	9,943	[a]11,499	4,831	3,543	2,088	5,884	6,476	8,790	10,229
20	[a]8,383	3,513	7,917	9,565	10,952	3,587	3,257	.....	4,960	[a]5,329	8,024	8,805
21	7,687	3,422	8,189	[a]8,225	10,064	3,315	[a]4,695	.....	4,962	7,024	7,518	8,824
22	6,120	3,839	8,548	8,659	9,715	4,951	3,896	.....	[a]3,468	6,272	7,816	[a]6,973
23	5,842	3,022	9,615	7,959	8,733	[a]4,271	3,213	.....	5,722	5,993	7,682	11,149
24	6,000	[a]4,458	[a]15,071	10,472	8,254	4,643	2,990	.....	5,663	5,719	[a]6,202	20,331
25	6,483	3,238	14,037	16,501	8,659	3,925	6,661	.....	6,516	5,408	8,118	18,291
26	5,604	2,513	14,528	17,833	[a]7,371	4,051	4,064	.....	5,719	5,297	7,800	19,844
27	4,494	3,726	14,484	25,928	7,644	4,717	3,586	2,448	5,791	[a]5,190	7,716	18,401
28	4,942	2,354	18,740	[a]24,305	8,769	3,686	[a]3,705	3,487	5,065	9,483	7,320	19,180
29	6,497	.....	27,477	24,533	9,479	4,009	3,281	3,393	[a]5,320	22,414	6,907	[a]17,451
30	5,568	.....	32,306	23,749	8,769	[a]3,713	3,251	3,228	8,796	23,578	6,808	16,221
31	5,036	.....	[a]36,196	.....	8,755	.....	2,896	3,170	.....	17,943	.....	18,258
1908.												
1	18,006	3,207	[a]6,716	28,514	29,609	9,168	1,820	1,514	1,591	1,144	[a]2,090	3,663
2	17,214	[a]3,312	8,403	25,670	31,942	7,953	1,875	[a]1,318	1,109	1,289	2,385	2,316
3	15,842	3,872	9,285	22,404	[a]31,969	7,286	1,610	1,851	992	1,779	2,326	2,351
4	11,832	3,558	9,075	19,353	29,539	5,789	1,510	1,451	1,107	[a]1,200	1,494	2,447
5	[a]9,047	4,979	8,562	[a]15,765	26,729	5,346	[a]1,480	1,367	1,310	1,331	1,619	1,941
6	10,426	5,314	7,853	15,451	23,522	4,683	3,137	1,910	[a]1,100	1,423	1,713	[a]2,170
7	9,015	5,159	6,358	16,991	21,009	[a]3,754	2,697	2,057	1,070	1,192	1,405	2,401
8	9,114	3,765	[a]6,473	18,021	23,199	3,985	2,370	1,903	986	1,452	[a]940	2,421
9	9,219	[a]3,620	8,546	26,675	25,554	4,106	2,105	[a]1,700	973	1,569	1,620	2,088
10	9,822	4,169	7,593	26,690	[a]24,705	4,106	2,166	2,232	1,143	1,292	1,478	2,000
11	7,981	5,520	7,174	26,454	23,716	4,143	1,914	1,555	1,256	[a]1,250	1,401	1,826
12	[a]11,722	5,221	9,198	[a]26,707	20,087	3,198	[a]1,638	1,555	1,097	1,279	1,395	2,137
13	9,905	6,874	12,047	26,454	18,097	2,781	1,872	1,371	[a]1,002	1,038	1,386	[a]976
14	7,655	7,572	17,996	25,204	19,797	[a]2,186	2,238	1,342	939	1,170	1,065	2,563
15	7,985	14,611	[a]16,101	22,271	21,716	2,812	1,925	1,310	1,046	1,240	[ab]1,320	1,862
16	6,948	[a]28,259	18,544	22,127	18,374	4,368	1,640	[a]1,280	1,451	1,326	1,640	2,588
17	6,948	19,487	13,646	20,560	[a]16,027	4,537	1,700	1,750	1,214	1,270	2,979	1,965
18	5,296	17,468	14,851	18,768	15,649	3,665	1,734	1,841	1,179	[ab]1,100	1,990	2,231
19	[a]4,854	16,990	14,248	[a]18,313	13,348	2,753	[a]1,487	2,107	992	1,210	2,376	2,510
20	7,573	15,878	13,365	18,963	12,786	2,753	1,987	2,265	[a]773	1,224	1,427	[a]557

[a] Sunday.

[b] Discharge not given October 18, 1908; assumed 1,100 second-feet by the United States Geological Survey in order to make the year complete.

Daily discharge in second-feet of Hudson River at Mechanicville, N. Y., for 1907–8—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	6,587	14,787	11,747	17,519	12,524	[a]2,566	2,480	1,810	673	1,204	2,061	2,597
22	6,725	13,504	[a]10,978	17,848	12,289	2,461	3,250	1,840	728	1,270	[a] 454	1,570
23	6,226	[a]11,998	11,349	16,124	10,679	2,579	3,116	[a]1,747	703	1,253	1,756	1,695
24	5,702	12,243	16,273	16,677	[a]12,195	2,230	2,695	1,826	734	1,288	1,975	1,806
25	4,466	11,479	18,452	16,648	12,078	2,130	2,640	2,140	701	[a] 1,061	1,764	1,300
26	[a] 2,689	10,069	16,644	[a]19,933	9,778	2,670	[a]2,622	2,108	941	1,254	1,834	890
27	6,743	10,291	18,618	24,379	10,026	2,540	2,338	2,068	[a] 900	1,438	1,636	[a] 2,014
28	7,186	9,616	21,952	34,335	8,365	[a]2,467	2,130	2,094	987	1,485	3,182	2,454
29	6,252	8,243	[a]28,918	32,335	7,393	1,940	2,320	1,870	982	2,185	[a] 3,518	1,532
30	5,914	.....	32,768	31,767	6,423	1,767	2,160	[a]1,790	1,006	2,304	3,415	1,732
31	5,795	.....	31,723	.....	[a] 7,151	.....	1,721	1,863	.....	2,275	.....	1,784

[a] Sunday.

Monthly discharge of Hudson River at Mechanicville, N. Y., for 1907–8.

[Drainage area, 4,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	19,000	4,490	10,300	2.29	2.64
February	5,660	2,350	4,140	.920	.96
March	36,200	2,400	9,570	2.13	2.46
April	36,700	7,960	16,600	3.69	4.12
May	24,300	7,370	13,900	3.09	3.56
June	8,410	3,320	5,560	1.24	1.38
July	6,670	2,800	4,120	.916	1.06
August	3,490	1,310	2,390	.531	.61
September	10,300	3,260	6,150	1.37	1.53
October	23,600	5,190	9,560	2.12	2.44
November	31,800	6,200	14,000	3.11	3.47
December	22,800	3,490	12,000	2.67	3.08
The year	36,700	1,310	9,020	2.01	27.31
1908.					
January	18,000	2,690	8,410	1.87	2.16
February	28,300	3,210	9,690	2.15	2.32
March	32,800	6,360	14,000	3.11	3.58
April	34,300	15,500	22,300	4.96	5.53
May	32,000	6,420	17,900	3.98	4.59
June	9,170	1,770	3,760	.836	.93
July	3,250	1,480	2,140	.476	.55
August	2,260	1,280	1,770	.393	.45
September	1,590	673	1,020	.227	.25
October	2,300	1,040	1,380	.307	.35
November	3,520	454	1,850	.411	.46
December	3,660	557	2,010	.447	.52
The year	34,300	454	7,190	1.60	21.69

NOTE.—Discharge interpolated August 20 to 26, 1907, by the United States Geological Survey in order to complete the year.

CHAMPLAIN CANAL AND GLENS FALLS FEEDER, N. Y.

The discharge of Hudson River at both Fort Edward and Mechanicville is diminished somewhat by the water required for operating the Champlain Canal. In the northern portion of this canal—from Northumberland to Lake Champlain, at Whitehall—the summit level (between Fort Edward and Fort Ann) is supplied (1) by the

Glens Falls feeder, a branch canal, leaving the Hudson about 2 miles above Glens Falls, and (2) by Wood Creek.

At Northumberland the canal crosses the Hudson and the southern portion receives its principal water supply here.

The quantity of water diverted from Hudson River for the Champlain Canal has been measured occasionally at various points, and a summary of measurements made prior to 1907 follows, these results being compiled principally from the reports of the state engineer of New York.

Measurements of water diverted from Hudson River for Champlain Canal.

	Sec.-ft.
Glens Falls feeder:	
At guard lock near feeder dam—	
Rafter, October 8, 1895	383
Horton, August 25, 1904	302
At Glens Falls, Change Bridge—	
Rafter, October 8, 1895	364
Horton, September 25, 1905 (11 a. m.)	295
Horton, September 25, 1905 (3 p. m.)	292
At Glens Falls, just above waste weir—	
Rafter, October 9 and 10, 1895	213
At Glens Falls, one-half mile below site of previous gaging—	
Rafter, October 10, 1895	191
At Sandy Hill, near entrance to Champlain Canal—	
Rafter, October 11, 1895	182
Champlain Canal, north from Sandy Hill to Lake Champlain:	
Just north of Glens Falls feeder entrance—	
Rafter, October 11, 1895	74
Champlain Canal, south from Sandy Hill to Northumberland:	
Notre Dame Street Bridge, Fort Edward—	
Weeks, August 29, 1905	78
Weeks, September 25, 1905	138
Champlain Canal, south from Northumberland to Mechanicville:	
Between locks 9 and 10—	
Kuichling, October 10, 1900	131
Kuichling, October 11, 1900	139
Mechanicville, Saratoga Street Bridge—	
Weeks, August 29, 1905	84

During 1907 additional measurements of flow were made by the hydrographers of the Geological Survey for the New York state water-supply commission, the results following:

Measurements of flow in Champlain Canal, etc., October 9 to 12, 1907.

No.	Locality.	Date.	Discharge (second-feet).	Mean velocity (feet per second).	Remarks.
	Below Northumberland.				
1	Champlain Canal at Mechanicville	Oct. 9	90.1	0.36	
2	Spillway near Mechanicville	...do	7	.....	Estimated.
3	Spillway at Bemis	...do	13.1	1.27	
4	Spillway at Stillwater	...do	11.3	.71	
5	Schuyler Creek opposite spillway at Stillwater	...do	10–15	.....	Do.
6	Champlain Canal at Stillwater	...do	101	.53	
7	Champlain Canal below Coveville	...do	131	.46	
8	Spillway near Coveville	...do	5 to 8	.....	Do.
9	.....do	...do	1	.....	Do.
10	.....do	...do	4 or 5	.....	Do.
11	Champlain Canal at Coveville	...do	89.5	.34	
12	Champlain Canal at Schuylerville	Oct. 10	16.2	.05	Do.
13	Lock at head of Champlain Canal, Northumberland	...do	4–6	.....	Do.
	Above Northumberland.				
14	Lock at end of Champlain Canal, Northumberland	Oct. 10	3–5	.....	
15	Champlain Canal at Fort Edward	...do	.....	.....	
16	Glens Falls feeder at Sandy Hill	Oct. 11	159	.67	
17	Champlain Canal at Sandy Hill	...do	90.1	.25	
18	Spillway between Fort Edward and Glens Falls feeder at Sandy Hill.	...do	1	.....	Do.
19	Glens Falls feeder at Glens Falls	Oct. 12	176	.67	
20	.....do	...do	213	.78	

1. Made from Saratoga Street Bridge.
2. This spillway is about 250 yards above mill of West Virginia Pulp Company at Mechanicville; is 90 feet across; water flowing over about 1 inch in depth.
5. Schuyler Creek flows into the canal opposite the Stillwater spillway; no measurement of this could be made, but estimated flow was 10 or 15 second-feet.
6. Measurement from bridge at Stillwater.
7. Measurement from bridge No. 45, opposite W. F. Curtis's.
8. Spillway between bridges Nos. 46 and 47; not sufficient flow for measurement. Estimated at 5 to 8 second-feet.
9. Spillway just above bridge No. 51; estimated flow at 1 second-foot.
10. Small spillway 75 yards below Coveville; estimated flow 4 or 5 second-feet.
11. Measurement from footbridge behind Coveville post-office.
12. Measurement from bridge No. 63; soundings made but only a trace of velocity; estimated at 0.05 foot per second. There are three spillways just below this bridge; and at bridge No. 62, 250 yards below, there is absolutely no velocity.
13. Lock not in use at this time; estimated leakage 4 to 6 second-feet.
14. Lock at end of canal; estimated leakage 3 to 5 second-feet.
15. At East Street Bridge, Fort Edward; current while soundings were being made, but ceased before measurement; about 5 second-feet leakage through lock here.
16. From Change Bridge west of trolley line at Sandy Hill.
17. From bridge 45 feet north of entrance of Glens Falls feeder; current runs north.
18. There is but one bridge between Fort Edward and Glens Falls feeder, about 150 yards above Fort Edward lock; barely a trace of current here in canal. Estimated flow over lock gates, 10 or 12 second-feet. Between Fort Edward and Glens Falls feeder is one small waste weir; estimated flow over this 1 second-foot.
19. At plate-girder highway bridge at Glens Falls.
20. At Change Bridge near feeder dam, Glens Falls.

Measurements of flow in Champlain Canal, etc., October 29 to 30 and November 23, 1907.

No.	Locality.	Date.	Discharge (second-feet).	Mean velocity (feet per second).
1	Champlain Canal at Mechanicville	Oct. 29	130	0.52
17	Champlain Canal at Sandy Hill	...do	125	.32
16	Glens Falls feeder at Sandy Hill	...do	177	.88
15	Champlain Canal at Fort Edward	...do	129	.51
19	Glens Falls feeder at Glens Falls	Oct. 30	203	.81
20	.....do	...do	232	.88
1	Champlian Canal at Mechanicville	Nov. 23	108	.44
15	Champlain Canal at Fort Edward	...do	140	.55
16	Glens Falls feeder at Sandy Hill	...do	176	.73

Gagings were made by the state engineers' assistants as follows:

Current-meter discharge measurements of Glens Falls feeder.

AT FIRST BRIDGE BELOW DAM ABOVE GLENS FALLS.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. feet.*	*Feet.*	*Sec.-feet.*
November 26	E. F. Weeks	42.5	238	8.8	223
Do	do	42.5	233	8.72	193
AT FERRY STREET BRIDGE, SANDY HILL.					
November 26	E. F. Weeks	47.5	232	6.38	226
Do	do	47.5	231	6.4	200

From the foregoing data the following conclusions have been drawn as to conditions during 1907:

Apparently about 220 second-feet enters the Glens Falls feeder from Hudson River. This is considerably less than that found by Rafter in 1895, and is occasioned by the better condition of the canal and the smaller amount of leakage in the vicinity of Glens Falls. About 60 second-feet returns to the river before reaching Fort Edward, leaving 160 second-feet which enters the Champlain Canal, and which should be added to the recorded flow of the Hudson River at Fort Edward. Of this amount about 90 second-feet flows north toward Lake Champlain and is permanently diverted from the Hudson drainage. The remaining 70 second-feet flows south and probably nearly all gets back into the Hudson at or above the Northumberland crossing.

The supply of water taken for the southern part of the canal, below Northumberland, is probably about 90 second-feet, which with the 90 second-feet flowing north into Lake Champlain makes a total of about 180 second-feet to be added to the recorded flow at Mechanicville.

It will be noted that the gagings have nearly all been made late in the season when perhaps the use of water was not at a maximum.

In view of this fact the following values are assumed as applicable during the portion of the season that the canal is in operation (from about May to November, inclusive): At Fort Edward add 180 second-feet to the recorded flow; at Mechanicville add 200 second-feet to the recorded flow.

INDIAN LAKE RESERVOIR AT INDIAN LAKE, N. Y.

This station is located at a masonry storage dam at the outlet of Indian Lake. It was established July 22, 1900, to determine the total outflow from this reservoir. The drainage area at this point is 131 square miles, including about 9.3 square miles of water surface of Indian Lake at the elevation of the spillway of the dam.

The flow of the upper Hudson has been controlled to a considerable extent during the dry season by the use of Indian Lake reservoir, since its completion in 1899. The total storage provided is about 4.7 billion cubic feet, which affords a discharge of nearly 600 second-feet for a period of ninety to one hundred and thirty days each year.

The record at this station includes the elevation of the water surface in the reservoir, the depth of water flowing over the spillway or flashboards, the depth of opening and the head on the main and subsidiary logways, and the depth of the opening and the affective head on each of the 5-foot sluice gates. A meteorological station has also been established at the dam by the United States Weather Bureau, and records are kept of the rainfall, temperature, etc.

The crest of the dam is 106.05 feet long in the clear. To facilitate the calculation of discharge over the spillway, a series of experiments was made at Cornell University in 1899 on a full-sized model of the spillway section, 6.58 feet long, from which the coefficient of discharge has been determined.

No computations of discharge have been made, pending some current meter measurements to rate discharge through the gates, and at present the record of reservoir level alone is available.

The datum of the gage has remained the same during the maintenance of the station. The elevation of the spillway crest above mean tide is 1,650 feet.

The maximum gage height of Indian Lake reservoir since the establishment of the station occurred April 27, 1908, and was 37 feet. The minimum gage height was 2 feet, and occurred from March 9 to 18, 1907.

Information in regard to this station is contained in reports of the state engineer and surveyor, State of New York.

Daily gage height, in feet, of Indian Lake Reservoir at Indian Lake, N. Y., for 1907–8.

[Lester Sevarie, jr., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.55	10.5	4.0	12.05	23.35	29.85	32.1	30.6	22.45	22.1	28.0	33.25
2	5.75	10.5	3.75	12.9	23.8	29.9	32.15	30.45	22.2	22.15	28.1	33.3
3	6.05	10.2	3.5	13.35	24.4	29.95	32.25	30.25	21.95	22.35	28.75	33.35
4	6.4	10.0	3.25	13.85	25.0	30.0	32.35	30.05	21.9	22.4	29.15	33.4
5	6.75	9.85	3.0	14.15	25.75	30.05	32.35	29.85	21.85	22.6	29.35	33.4
6	7.0	9.65	2.75	14.5	26.25	30.1	32.4	29.6	22.05	22.75	29.65	33.45
7	7.75	9.4	2.5	14.85	26.6	30.3	32.45	29.35	22.1	22.85	30.0	33.5
8	7.5	9.25	2.25	15.15	26.9	30.35	32.5	29.2	22.15	22.45	30.4	33.55
9	7.75	9.0	2.0	15.35	27.25	30.4	32.5	29.0	22.2	24.05	30.85	33.6
10	8.05	8.85	2.0	15.6	27.5	30.5	32.5	28.75	22.25	24.35	31.15	34.1
11	8.3	8.6	2.0	15.75	27.75	30.6	32.5	28.55	22.6	24.7	31.35	34.85
12	8.5	8.35	2.0	15.95	28.0	30.65	32.6	28.3	23.05	25.0	31.55	35.1
13	8.7	8.15	2.0	16.15	28.1	30.75	32.65	28.05	23.3	25.2	31.7	35.25
14	8.85	8.0	2.0	16.3	28.25	30.85	32.7	27.8	23.5	25.35	31.85	35.4
15	9.0	7.85	2.0	16.4	28.35	30.9	32.75	27.55	23.6	25.55	32.0	35.5
16	9.1	7.6	2.0	16.55	28.5	31.0	32.8	27.35	23.65	25.65	32.1	35.55
17	9.15	7.35	2.0	16.65	28.65	31.1	32.8	27.1	23.75	25.75	32.15	35.55
18	9.25	7.1	2.0	16.8	28.85	31.1	32.8	26.6	23.85	25.85	32.25	35.5
19	9.35	6.85	2.5	16.9	28.9	31.15	32.8	26.1	23.85	25.9	32.35	35.45
20	9.5	6.6	3.0	17.0	29.0	31.25	32.8	25.65	23.9	25.95	32.4	35.4
21	9.6	6.35	3.5	17.1	29.1	31.35	32.8	25.25	23.95	26.0	32.5	35.35
22	9.65	6.1	4.0	17.25	29.15	31.45	32.85	24.85	23.6	26.05	32.6	35.35
23	9.8	5.85	4.5	17.35	29.25	31.6	32.6	24.4	23.35	26.1	32.7	35.4
24	9.9	5.6	5.0	17.75	29.25	31.65	32.4	24.0	23.1	26.15	32.75	35.75
25	10.0	5.35	5.5	18.4	29.3	31.7	32.15	23.6	22.85	26.2	32.85	35.9
26	10.1	5.1	6.0	19.35	29.4	31.75	31.9	23.15	22.55	26.3	32.9	36.0
27	10.25	4.6	6.4	20.15	29.6	31.8	31.8	23.75	22.35	26.35	33.0	35.9
28	10.3	4.25	7.35	20.85	29.65	31.8	31.5	23.35	22.1	26.75	33.05	35.75
29	10.35	.....	8.65	21.6	29.75	31.85	31.3	23.1	22.0	27.25	33.1	35.65
30	10.4	.....	10.35	22.5	29.85	32.0	31.1	22.9	21.95	27.6	33.15	35.65
31	10.5	.....	11.65	.....	29.7	.....	30.85	22.7	.....	27.85	.....	35.7

Date.	Sluice gate A open.	Sluice gate B open.	Date.	Sluice gate A open.	Sluice gate B open.
1907.	*Feet.*	*Feet.*	1907.	*Feet.*	*Feet.*
January 1 to 8	5.0	5.0	August 16 to 27	5.0	.....
February 1 to 28	5.0	5.0	August 1 to 31	.....	5.0
March 1 to 9	5.0	.....	September 2 to 4	5.0	.....
March 1 to 18	.....	5.0	September 21 to 30	2.0	.....
May 23	.....	2.5	September 1 to 5, 21 to 25	.....	5.0
May 30	.....	4.0	September 26 to 29	.....	3.0
May 31	.....	4.41	October 1	2.0	.....
July 22 to 31	.....	5.0	December 27 to 31	.....	1.5

NOTE.—The reservoir gates were shut during 1907 as follows: January 9 to 31, March 19 to July 21 (except May 23, 30, and 31), September 5 to 19, and October 2 to December 26.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	35.65	34.9	34.75	28.25	36.85	34.4	33.45	27.15	20.3	14.0	8.9	6.55
2	35.6	34.9	34.6	28.5	36.65	34.35	33.4	26.9	20.0	13.85	8.88	6.4
3	35.5	34.88	34.35	28.65	36.25	34.35	33.15	26.65	19.85	13.62	8.75	6.38
4	35.35	34.7	34.1	28.85	35.85	34.3	32.9	26.4	19.62	13.4	8.62	6.25
5	35.15	34.4	33.85	28.9	35.5	34.25	32.65	26.2	19.4	13.3	8.5	6.15
6	35.08	34.2	33.3	29.08	35.15	34.2	32.4	25.9	19.2	13.1	8.38	6.0
7	35.08	34.0	32.85	29.35	35.25	34.15	32.15	25.8	18.0	12.9	8.25	5.9
8	35.08	33.85	32.4	30.0	35.62	34.1	31.9	25.5	18.8	12.75	8.1	5.85
9	35.08	33.65	31.95	30.6	35.85	34.08	31.75	25.25	18.6	12.6	8.0	5.75
10	35.08	33.3	31.5	31.25	35.9	34.05	31.6	25.0	18.35	12.4	7.88	5.65
11	35.08	33.05	31.08	31.9	35.9	34.0	31.3	24.75	18.0	12.25	7.8	5.6
12	35.08	32.85	30.62	32.4	35.4	33.95	31.0	24.55	17.75	12.08	7.7	5.6
13	35.05	32.6	30.15	32.9	34.9	33.9	30.65	24.38	17.5	11.9	7.62	5.6
14	35.05	32.4	29.75	33.35	34.4	33.88	30.4	24.15	17.25	11.75	7.55	5.5
15	35.0	32.62	29.4	33.6	34.08	33.85	30.1	23.9	17.05	11.6	7.45	5.45

Daily gage height, in feet, of Indian Lake Reservoir at Indian Lake, N. Y., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	35.0	33.5	29.08	33.88	33.85	33.8	29.85	23.65	16.85	11.4	7.38	5.35
17	34.95	34.15	28.75	34.1	33.9	33.75	29.65	23.5	16.62	11.25	7.3	5.3
18	34.95	34.65	28.4	34.35	34.0	33.7	29.5	23.35	16.4	11.08	7.2	5.2
19	34.9	34.85	28.08	34.65	34.08	33.65	29.3	23.08	16.15	10.9	7.08	5.1
20	34.9	35.0	27.7	34.9	34.1	33.65	29.08	22.85	15.95	10.75	6.95	5.0
21	34.9	35.08	27.25	35.0	34.15	33.65	29.0	22.62	15.8	10.6	6.85	4.9
22	34.88	35.08	26.9	35.08	34.05	33.65	29.0	22.4	15.62	10.4	6.75	4.85
23	34.88	35.08	26.6	35.25	33.9	33.65	29.0	22.15	15.4	10.25	6.65	4.75
24	34.88	35.05	26.2	35.75	33.85	33.65	28.95	21.88	15.2	10.08	6.62	4.62
25	34.88	35.05	25.85	36.2	33.9	33.65	28.95	21.65	15.0	9.9	6.6	4.6
26	34.85	34.95	25.65	36.65	34.0	33.65	28.75	21.45	14.85	9.75	6.55	4.5
27	34.85	34.9	25.65	37.0	34.05	33.62	28.45	21.25	14.65	9.6	6.6	4.4
28	34.88	34.88	26.0	37.0	34.08	33.6	28.25	21.05	14.45	9.4	6.62	4.35
29	34.88	34.85	26.75	36.9	34.05	33.55	28.05	20.85	14.25	9.3	6.62	4.25
30	34.9	.....	27.45	36.65	34.15	33.5	27.65	20.7	14.25	9.15	6.62	4.15
31	34.9	.....	27.88	.....	34.35	.....	27.4	20.5	.....	9.05	.....	4.08

Date.	Sluice gate A open.	Sluice gate B open.	Date.	Sluice gate A open.	Sluice gate B open.
1908.	*Feet.*	*Feet.*	1908.	*Feet.*	*Feet.*
January 1 to 6	.....	1.5	May 1 to 5[b]	.....	4.5
February 3 to 14	.....	5.0	May 6	.....	1.25
February 8 to 14	6.0	.....	May 21 to 23[b]	.....	3.58
March 1 to 27	.....	5.0	July 2 to 7, 10 to 20, and 25 to 30	.....	5.0
March 5 to 25	5.0	.....	July 8 to 9	.....	3.0
April 25	.....	1.5	August 1 to December 31	.....	5.0
April 26	.....	2.5			
April 27 to 30[a]	.....	4.5			

[a] Small logway open 10 feet April 27, and 14 feet April 28.
[b] Main logway open 1.33 feet in width from May 2 to 11. Main logway open 15 feet in width from May 12 to 16. Small logway open 15 feet from May 1 to 5.

SCHROON RIVER BASIN.

DESCRIPTION.

Schroon River rises in Essex County, along the southern slopes of the highest mountains in the Adirondack group, flows in a general southerly direction for about 45 miles through Essex and Warren counties, and joins the Hudson near Thurman. Its total drainage area is 550 square miles. Its headwaters reach an elevation of about 2,000 feet above mean tide, while at its mouth it is at an elevation of about 600 feet.

Its basin is largely forested and contains considerable wild land and numerous lakes and ponds. The most important of these is Schroon Lake, through which the river flows, which has water surface area of about 6.3 square miles. The river affords excellent opportunities for storage and power development, which are under investigation by the New York State Water Supply Commission. The only power developments are at Warrensburg.

SCHROON LAKE NEAR POTTERSVILLE, N. Y.

This station is located at the outlet of Schroon Lake, 1 mile from Pottersville post-office, and is at the steamboat wharf. It was established July 8, 1908, in cooperation with the New York state water supply commission, to obtain information concerning fluctuations in the level of Schroon Lake in connection with the gaging station on Schroon River at Riverbank. The gage datum is at elevation 803.75 feet above mean sea level, and has remained the same during the maintenance of the station.

Information in regard to this station is contained in the annual reports of the state water supply commission of New York.

Daily gage height, in feet, of Schroon Lake near Pottersville, N. Y., for 1908.

[C. H. Glassbrook, observer.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.							1908.						
1	.....	1.6	1.8	0.7	0.6	0.4	16	1.0	1.7	1.2	0.7	0.5	.....
2	.....	1.6	1.8	.7	.6	.5	17	.9	1.8	1.2	.7	.5	.....
3	.....	1.6	1.7	.7	.5	.5	18	.8	1.8	1.2	.7	.5	.....
4	.....	1.6	1.7	.6	.5	.5	19	1.1	1.9	1.1	.7	.4	.....
5	.....	1.6	1.7	.6	.5	.5	20	1.2	1.9	1.0	.6	.4	.....
6	.....	1.6	1.7	.5	.5	.....	21	1.3	1.9	.9	.6	.4	.....
7	.....	1.6	1.7	.5	.5	.....	22	1.3	1.9	.9	.6	.4	.....
8	1.8	1.6	1.7	.5	.6	.....	23	1.4	.....	.8	.6	.4	.....
9	1.7	1.6	1.6	.5	.6	.....	24	1.4	.....	.8	.6	.3	.....
10	1.6	1.6	1.6	.5	.6	.....	25	1.4	.....	.7	.6	.3	.....
11	1.5	1.6	1.5	.6	.5	.....	26	1.5	.....	.6	.7	.3	.....
12	1.4	1.7	1.5	.6	.5	.....	27	1.5	.....	.6	.7	.3	.....
13	1.3	1.7	1.4	.6	.5	.....	28	1.5	.....	.5	.7	.3	.....
14	1.2	1.7	1.4	.6	.5	.....	29	1.6	.....	.5	.7	.4	.....
15	1.1	1.7	1.3	.7	.5	.....	30	1.6	1.8	.6	.6	.4	.....
							31	1.6	1.8	.....	.6	.....	.....

NOTE.—Dam 4 miles below at Starbuckville closed July 19.

SCHROON RIVER AT RIVERBANK, N. Y.

This station is located on the steel highway bridge near Riverbank post-office, between the towns of Warrensburg and Bolton, about 9 miles north of the village of Warrensburg, and about 10 miles downstream from the outlet of Schroon Lake. It was established September 23, 1907, in cooperation with the New York State Water Supply Commission, to obtain general statistical data in regard to the flow of Schroon River.

There are several dams at the village of Warrensburg which are used for power development. During September, 1907, a timber crib dam for storage was constructed at Starbuckville, about 6 miles above the gaging station. This dam affords a head of about 8 feet and ponds water to Schroon Lake. Tumble Head Falls begin about 1 mile above the gaging station and extend upstream for about a mile farther, affording a total fall of some 30 feet.

The datum of the gage has remained the same during the maintenance of the station. During the winter months the discharge is affected by ice. Conditions for obtaining accurate discharge are good, and a very good rating curve has been developed.

Since 1907 the regimen of flow of Schroon River during the low-water season has been considerably affected by the storage held in Schroon Lake.

Information in regard to this station is contained in the annual reports of the state water supply commission of New York.

Discharge measurements of Schroon River at Riverbank, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
September 2	Barrows and Hoyt	42.5	102	1.18	94.8
Do	do	41.5	100	1.18	91.2
September 23	Hoyt and Pierson	63.0	177	1.90	321
October 3	J. B. Pierson	67.0	190	2.26	463
Do	do	67.0	185	2.25	438
October 23	do	65.0	190	2.32	492
November 11	do	84.0	419	5.47	3,360
November 14	do	71.0	298	4.33	2,000
November 27	do	67.0	214	2.92	768
December 14	do	74.0	266	3.63	1,240
December 19 [a]	do	74.0	262	3.48	1,240
1908.					
January 23	Wood and Pierson	72.0	216	3.02	766
July 6 [b]	G. M. Brett	74.0	246	2.92	517
Do [b]	do	74.0	247	2.92	514
July 16	do	67.0	163	1.87	288
December 31 [c]	C. R. Adams	57.5	136	1.54	183

[a] Anchor ice at gaging section.
[b] Backwater from log jam below.
[c] Conditions of flow slightly affected by partial ice cover.

Daily gage height, in feet, of Schroon River at Riverbank, N. Y., for 1907–8.

[J. H. Roberts, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1907.[a]					1907.[a]					1907.[a]				
1	.....	2.40	2.90	2.95	11	1.64	2.75	5.50	2.50	21	0.99	2.40	3.12	3.30
2	1.19	2.32	3.05	2.90	12	1.74	2.70	5.00	2.92	22	1.09	2.38	3.15	3.15
3	1.31	2.30	3.35	2.85	13	1.79	2.60	4.55	3.50	23	1.89	2.35	3.02	3.35
4	1.29	2.22	3.05	2.98	14	1.79	2.58	4.35	3.60	24	2.00	2.32	3.00	3.60
5	1.39	2.28	3.90	2.90	15	0.99	2.58	3.90	3.62	25	1.90	2.32	2.92	3.90
6	1.64	2.20	3.90	2.90	16	0.97	2.52	3.90	3.60	26	1.95	1.68	2.70	4.08
7	1.69	2.28	4.35	2.80	17	1.04	2.55	3.55	3.60	27	1.88	2.20	2.85	4.15
8	1.64	2.60	5.42	2.68	18	0.99	2.50	3.80	3.55	28	1.60	2.50	2.80	4.10
9	1.54	2.65	5.88	2.75	19	0.99	2.45	3.15	3.50	29	1.20	2.55	2.85	4.05
10	1.59	2.80	5.75	2.70	20	1.07	2.42	3.30	3.30	30	2.30	2.58	3.00	4.00
										31	.....	2.70	.....	4.10

[a] Low-gage heights, September 15 to 22, 1907, caused by holding back water in Schroon Lake by a dam completed at that time.

Daily gage height, in feet, of Schroon River at Riverbank, N. Y., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.[a]												
1	4.1	3.6	3.0	5.7	6.1	3.55	3.5	1.15	1.39	1.48	1.02	1.67
2	4.0	3.65	3.1	5.55	6.25	3.6	3.1	1.2	1.29	1.63	1.52	1.62
3	3.9	3.65	3.4	5.45	6.2	3.45	3.1	1.25	1.29	1.08	1.82	1.57
4	3.8	3.55	3.3	5.2	6.0	3.35	3.1	1.2	1.34	1.03	1.72	1.62
5	3.65	3.7	3.25	4.95	5.8	3.8	1.8	1.35	1.39	1.58	1.77	1.57
6	3.6	3.3	3.1	4.85	5.55	3.85	2.85	1.29	1.29	1.53	1.57	1.97
7	3.7	3.3	3.05	4.9	5.4	2.85	2.4	1.19	1.39	1.58	1.02	1.57
8	3.35	3.25	3.0	5.0	5.7	2.9	2.35	1.24	1.39	1.53	0.92	1.72
9	3.25	3.25	3.0	5.55	5.95	3.3	2.15	1.14	1.39	1.48	1.67	2.47
10	3.2	3.25	3.2	5.75	5.9	2.65	2.1	1.34	1.34	1.38	1.67	1.72
11	3.25	3.2	3.3	6.1	5.7	2.4	2.1	1.59	1.29	1.08	1.67	1.66
12	3.15	3.2	3.2	6.4	5.4	3.6	1.3	1.39	1.34	1.58	1.62	1.66
13	3.15	3.0	3.2	6.3	5.35	3.35	2.05	1.29	1.24	1.48	1.62	1.61
14	3.05	2.95	3.25	5.95	5.25	2.15	2.0	1.24	1.39	1.48	1.57	1.71
15	3.2	3.15	3.3	5.8	5.05	2.35	1.95	1.24	1.74	1.58	1.47	1.61
16	2.85	2.95	3.45	5.55	5.0	2.45	1.7	1.14	1.79	1.53	1.62	1.66
17	3.0	2.8	3.4	5.3	5.05	2.4	1.4	1.24	1.74	1.08	1.57	1.71
18	2.9	3.1	3.4	5.2	5.0	2.3	1.35	1.24	1.48	0.98	1.57	1.61
19	3.0	3.25	3.45	5.1	4.8	3.55	1.25	1.19	1.28	1.48	1.57	1.66
20	3.05	3.5	3.5	4.8	4.55	3.4	1.4	1.29	1.13	1.48	1.52	1.51
21	3.0	3.75	3.45	4.7	4.3	3.55	1.3	1.29	1.63	1.48	1.52	1.61
22	2.9	3.7	3.35	4.6	4.15	3.45	1.3	1.24	1.63	1.43	1.42	1.56
23	3.0	3.9	3.5	4.4	4.15	3.4	1.2	1.14	1.58	1.38	1.57	1.61
24	2.95	3.75	3.6	4.3	4.0	3.2	1.3	1.24	1.58	1.38	1.47	1.56
25	3.2	3.65	3.75	4.5	3.95	3.4	1.35	1.29	1.53	0.93	1.57	1.46
26	2.85	3.65	3.8	4.6	3.8	3.35	1.25	1.34	1.03	0.98	1.62	1.51
27	2.8	3.55	4.1	4.9	4.15	3.25	1.35	1.39	0.98	1.63	1.57	1.41
28	2.85	3.4	3.9	5.5	3.7	1.8	1.25	1.39	1.48	1.68	1.67	1.46
29	2.75	3.25	4.5	6.1	3.7	1.9	1.25	1.34	1.68	1.68	1.62	1.46
30	3.15	.....	5.5	6.05	4.2	3.3	1.35	1.34	1.63	1.67	1.67	1.41
31	3.1	.....	5.7	.....	3.8	.....	1.2	1.39	.....	1.57	.....	1.46

[a] River did not freeze over near the gage January to March, 1908, but conditions of flow may have been somewhat affected by ice conditions during this period. River frozen December 6 to 31, 1908. Conditions of flow somewhat affected by log jams during the first part of July.

Rating table for Schroon River at Riverbank, N. Y., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	35	2.00	350	3.10	900	4.40	2,102
1.00	53	2.10	390	3.20	966	4.60	2,327
1.10	74	2.20	432	3.30	1,040	4.80	2,561
1.20	97	2.30	476	3.40	1,120	5.00	2,800
1.30	122	2.40	522	3.50	1,200	5.20	3,040
1.40	149	2.50	568	3.60	1,290	5.40	3,280
1.50	178	2.60	618	3.70	1,380	5.60	3,520
1.60	210	2.70	668	3.80	1,474	5.80	3,760
1.70	242	2.80	721	3.90	1,572	6.00	4,000
1.80	276	2.90	776	4.00	1,674	6.20	4,240
1.90	312	3.00	836	4.20	1,884	6.40	4,480

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on 15 discharge measurements made during 1907 and 1908 and is well defined.

Monthly discharge of Schroon River at Riverbank, N. Y., for 1907–8.

[Drainage area, 534 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
September	476	[a] 48	184	0.345	0.38	A.
October	721	236	545	1.02	1.18	A.
November	3,860	668	1,530	2.87	3.20	A.
December	1,840	568	1,130	2.12	2.44	A.
1908.						
January	1,780	694	1,010	1.89	2.18	C.
February	1,570	721	1,130	2.12	2.29	C.
March	3,640	836	1,300	2.43	2.80	C.
April	4,480	1,990	3,160	5.92	6.60	A.
May	4,300	1,380	2,790	5.22	6.02	A.
June	.....	276	700	1.31	1.46	B.
July	1,200	97	335	.627	.72	B.
August	207	83	117	.219	.25	A.
September	273	49	160	.300	.33	A.
October	236	40	159	.298	.34	A.
November	283	39	195	.365	.41	A.
December	237	144	198	.371	.43	C.
The year	4,480	39	938	1.76	23.83	

[a] Not natural flow. (See gage heights.)

NOTE.—Discharge January to March may be slightly too high on account of ice conditions below the station. July is somewhat too large on account of log jams. June has been corrected approximately on account of backwater caused by log jams. Discharge December 6 to 31, 1908, 196 second-feet; estimated on the basis of a measurement made December 31 under ice conditions.

The monthly discharges for April, May, and June have been revised and differ slightly from those published in the fourth annual report of the State water supply of New York, being based on additional data recently available.

SACANDAGA RIVER BASIN.

DESCRIPTION.

Sacandaga River is formed by three principal branches which unite in the southeastern part of Hamilton County in the Adirondack region. The West Branch is the outlet of Piseco Lake, the Middle Branch is the outlet of Sacandaga and Pleasant lakes, while the East and principal branch issues from a series of small ponds and lakes in the southwestern part of Warren County. The East and Middle branches unite a few miles north of Wells and are joined by the West Branch a short distance below Wells. The river then flows southeasterly to about 5 miles below Northville, where it turns and runs northeasterly to the Hudson River at Hadley. Its total drainage area comprises about 1,050 square miles.

Sacandaga Lake, the highest of the tributary lakes in the headwaters, is about 1,700 feet above mean tide; at its entrance into the Hudson the Sacandaga is at an elevation of about 550 feet. Between

Northville and the mouth of the river there is a fall of about 180 feet (chiefly concentrated in the 5 miles below Conklingville) entirely unutilized. There are, in fact, no power developments on the Sacandaga.

The drainage area of this river is largely in forest. Precipitation is high, the mean for the year being about 49 inches, whereas that of the whole Hudson drainage area above Mechanicville is only about 43 inches. Possibilities for storage on the Sacandaga are great and the state water-supply commission of New York propose a high earth rock-fill dam at Conklingville, the reservoir storing about 25 billion cubic feet of water, with a water surface of about 40 square miles, and controlling practically the entire flow of the Sacandaga basin. Their plan proposes also to develop the total fall obtained between Conklingville and the Hudson—approximately 200 feet—which will afford 25,000 to 30,000 continuous horsepower.

SACANDAGA RIVER AT WELLS, N. Y.

This station is located on the steel highway bridge over the East Branch of Sacandaga River in the southern part of the village of Wells, about 2½ miles above the junction of the East and West branches. It was established August 26, 1907, in cooperation with the New York state water supply commission, to obtain general statistical and comparative data regarding the flow of this river.

The gage datum has been the same during the maintenance of the station. During the winter months the discharge is usually affected by ice. Conditions for obtaining the accurate discharge are good, and a fairly good rating curve has been developed.

Information in regard to this station is contained in the annual reports of the state water-supply commission of New York.

Discharge measurements of Sacandaga River at Wells, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 25[a]	Barrows and Hoyt	37.5	21.4	3.72	23.0
August 26[b]	do	50.0	47.4	3.72	26.8
September 26	J. B. Pierson	66.0	145	4.40	178
October 7	do	67.0	172	4.84	318
Do	do	67.0	166	4.84	284
October 21	do	67.0	170	4.85	335
November 8[c]	do	95.0	384	7.50	3,150
November 21	do	68.0	198	5.20	542
December 18	do	70.0	218	5.45	636
1908.					
January 27[d]	D. M. Wood	67.5	168	4.64	290
June 26	do	67.0	110	4.25	115
September 16[b]	do	36.5	24.8	3.50	11.7

[a] Wading measurement about 1 mile above gage.
[b] Wading measurement about 800 feet above gage.
[c] Measurement made with surface floats near bridge.
[d] Poor measuring conditions; anchor ice.

Daily gage height, in feet, of Sacandaga River at Wells, N. Y., for 1907–8.

[Frank F. Stanyon, jr., and Roscoe R. Stanyon, observers.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	3.72	4.48	5.65	5.02	16	.....	4.25	5.15	5.35	.....
2	.....	3.72	4.45	5.70	4.95	17	.....	4.25	5.08	5.30	.....
3	.....	3.82	4.55	7.60	4.95	18	.....	4.18	5.00	5.20	.....
4	.....	4.80	4.52	6.95	4.95	19	.....	4.12	4.90	5.15	.....
5	.....	5.05	5.15	6.15	4.92	20	.....	4.12	4.88	5.10	.....
6	.....	4.72	4.95	6.65	4.91	21	.....	4.11	4.85	5.05	.....
7	.....	4.50	5.10	8.15	4.89	22	.....	4.12	4.85	5.30	.....
8	.....	4.24	4.88	7.80	4.87	23	.....	4.06	4.82	5.19	.....
9	.....	4.20	4.92	7.08	4.85	24	.....	4.25	4.79	5.18	.....
10	.....	4.30	5.15	6.35	4.82	25	3.72	4.45	4.68	5.18	.....
11	.....	4.59	5.05	6.06	6.08	26	3.72	4.35	4.60	5.18	.....
12	.....	5.70	4.95	5.98	7.05	27	3.72	4.25	4.65	5.18	.....
13	.....	5.06	5.50	5.80	6.12	28	3.71	4.20	6.62	5.15	.....
14	.....	4.66	5.30	5.55	5.38	29	3.70	4.45	6.76	5.10	.....
15	.....	4.45	5.18	5.45	.....	30	3.70	4.42	6.10	5.10	.....
						31	3.70	.....	6.38	.....	.....

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	.....	4.79	5.18	6.71	8.85	5.58	4.08	3.81	3.59	3.90	4.29	4.49
2	.....	5.12	5.08	6.51	10.32	5.70	4.05	3.74	3.58	4.02	4.26	4.40
3	.....	5.28	5.08	6.34	8.10	5.42	4.02	3.72	3.57	4.04	4.20	4.16
4	.....	5.24	5.14	5.94	8.10	5.28	4.00	3.77	3.57	4.04	4.02	4.62
5	.....	5.26	5.14	5.86	8.35	5.28	4.02	3.80	3.56	3.91	4.04	4.44
6	.....	5.41	5.14	5.98	7.85	5.18	4.00	3.92	3.54	3.87	4.00	4.29
7	.....	5.48	5.01	6.51	7.50	5.05	4.05	3.94	3.58	3.85	3.96	4.60
8	.....	5.46	4.96	7.28	7.55	4.98	4.12	3.91	3.59	3.78	3.93	5.18
9	5.20	5.44	4.95	8.16	7.35	4.95	4.06	3.82	3.57	3.75	3.92	5.34
10	5.20	5.41	4.96	7.78	6.55	4.95	4.00	3.88	3.54	3.72	3.92	5.30
11	5.20	5.28	4.96	8.41	8.10	4.88	3.95	3.84	3.54	4.02	4.05	5.22
12	5.20	5.14	4.98	7.94	6.70	4.80	3.92	3.77	3.54	3.96	4.38	5.16
13	5.18	4.81	5.06	7.44	6.38	4.72	3.90	3.76	3.52	3.93	4.31	5.06
14	5.10	4.91	5.06	7.94	6.00	4.65	3.88	3.81	3.51	3.88	4.21	5.00
15	5.00	7.11	5.91	7.56	6.30	4.60	3.84	3.78	3.50	3.85	4.20	4.96
16	5.01	8.76	6.04	6.81	6.30	4.52	3.80	3.76	3.50	3.81	4.20	4.86
17	5.05	7.26	5.94	6.56	5.98	4.45	3.82	3.77	3.50	3.80	4.09	4.74
18	5.10	6.56	5.81	6.36	6.22	4.50	4.32	3.82	3.49	3.77	4.06	4.61
19	5.10	6.44	5.66	7.24	5.58	4.60	4.42	3.80	3.49	3.74	4.05	4.60
20	5.12	6.16	5.56	7.11	5.62	4.60	4.18	3.80	3.48	3.72	4.12	4.58
21	4.98	5.94	5.41	6.91	5.40	4.48	4.07	3.79	3.46	3.71	4.15	4.50
22	4.90	5.94	5.38	6.86	5.65	4.40	4.10	3.73	3.45	3.70	4.07	4.48
23	5.02	5.71	5.36	7.26	5.52	4.35	4.04	3.78	3.46	3.70	4.08	4.50
24	5.00	5.56	5.56	8.78	5.62	4.35	3.98	3.72	3.47	3.72	4.09	4.50
25	4.90	5.48	5.86	9.18	5.78	4.35	3.94	3.69	3.47	3.72	4.24	4.48
26	4.90	5.31	5.81	8.94	5.22	4.28	4.00	3.66	3.46	3.86	4.52	4.45
27	4.70	5.31	6.41	9.08	5.35	4.18	4.01	3.65	3.48	4.75	5.05	4.46
28	4.65	5.28	7.46	8.76	5.28	4.15	3.98	3.62	3.50	4.40	4.78	4.45
29	4.70	5.21	8.56	8.41	5.32	4.12	3.99	3.60	4.22	4.69	4.40	4.44
30	4.70	.....	7.54	8.31	5.30	4.09	3.92	3.60	4.08	4.61	4.36	4.46
31	4.66	.....	7.11	.....	5.55	.....	3.82	3.60	.....	4.40	.....	4.48

NOTE.—Conditions of flow probably affected by ice January to March, 1908.

Rating table for Sacandaga River at Wells, N. Y., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.50	12	4.80	300	6.10	1,190	7.80	3,660
3.60	17	4.90	340	6.20	1,300	8.00	4,000
3.70	24	5.00	380	6.30	1,410	8.20	4,340
3.80	35	5.10	430	6.40	1,530	8.40	4,680
3.90	50	5.20	480	6.50	1,660	8.60	5,020
4.00	70	5.30	540	6.60	1,790	8.80	5,360
4.10	92	5.40	600	6.70	1,920	9.00	5,700
4.20	115	5.50	670	6.80	2,060	9.20	6,040
4.30	140	5.60	740	6.90	2,200	9.40	6,380
4.40	165	5.70	820	7.00	2,350	9.60	6,720
4.50	195	5.80	900	7.20	2,660	9.80	7,060
4.60	225	5.90	990	7.40	2,980	10.00	7,400
4.70	260	6.00	1,090	7.60	3,320	11.00	9,100

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 12 discharge measurements made during 1907–8, and is fairly well defined between gage heights 3.5 feet and 5.5 feet. Above 5.5 feet it is based on one measurement at 7.5 feet.

Monthly discharge of Sacandaga River at Wells, N. Y., for 1907–8.

[Drainage area, 263 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
August 25–31	26	24	25	0.095	0.02	C.
September	820	26	185	.703	.78	B.
October	2,000	186	518	1.97	2.27	B.
November	4,260	405	1,120	4.26	4.75	B.
December	.....	.....	800	3.04	3.50	C.
1908.						
January	.....	242	450	1.71	1.97	C.
February	5,290	.....	862	3.28	3.54	C.
March	4,950	360	997	3.79	4.37	C.
April	6,010	954	3,140	11.90	13.28	A.
May	7,940	492	2,050	7.79	8.98	A.
June	820	90	297	1.13	1.26	B.
July	171	35	73.6	.280	.32	B.
August	58	17	32.1	.122	.14	C.
September	120	9	18.7	.071	.08	C.
October	280	24	71.2	.271	.31	B.
November	405	54	121	.460	.51	B.
December	564	106	266	1.01	1.16	D.
The year	7,940	9	698	2.65	35.92	

NOTE.—Discharge December 15, 1907, to February 14, 1908, estimated on the basis of general run-off conditions in the Upper Hudson River drainage basin.

	Second-feet.
Discharge December 15 to 31, 1907	939
February 1 to 14, 1908	250

SACANDAGA RIVER AT NORTHVILLE, N. Y.

This station is located about three-fourths of a mile upstream from the steel highway bridge at Northville, and was established August 26, 1907. It has been maintained in cooperation with the New York State Water Supply Commission to obtain general statistical and comparative data regarding the flow of the Sacandaga.

The station is about 1 mile below the outlet of East Stony Creek and about 2 miles below West Stony Creek. It is about 1¼ miles above a low storage dam at Sacandaga Park in Northville. Pondage from this dam extends to the highway bridge at certain stages.

The datum of the gage has remained the same during the maintenance of the station. The United States Weather Bureau maintains a river and flood station at the steel highway bridge. During the winter months the discharge is usually affected by ice to such an extent that gage readings are discontinued. Conditions for obtaining the accurate discharge for the remainder of the year are very good and an excellent rating curve has been developed.

Information in regard to this station is contained in the annual reports of the state water supply commission of New York, and of the state engineer and surveyor, State of New York.

Discharge measurements of Sacandaga River at Northville, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 24[a]	Barrows and Hoyt	55.0	57.1	0.86	76.9
Do.[a]	do	55.0	57.5	0.86	76.0
September 25	J. B. Pierson	260	956	2.03	603
September 27	do	260	930	1.92	466
October 8[b]	do	274	1,340	3.89	3,310
October 18	do	264	1,000	2.58	1,020
October 22	do	262	855	2.31	868
November 7[c]	do	284	2,570	9.68	18,300
November 9	do	277	1,420	5.81	6,310
November 20	do	264	953	2.78	1,360
November 22	do	266	958	2.98	1,410
December 21[d]	Wood and Pierson	180	1,490	7.28	1,200
1908.					
January 1	J. B. Pierson	273	1,300	4.54	3,350
June 25	D. M. Wood	259	644	1.45	284
July 2[e]	Wood and Brett	93	146	1.25	191
September 15[e]	D. M. Wood	41.5	48.6	0.66	42.2
Do.[e]	do	41.0	41.0	0.66	38.9

[a] Wading measurement about one-eighth mile above gage.
[b] River rose 1.02 feet during the measurement; results approximate.
[c] Measurement made with surface floats near Northville bridge.
[d] River frozen and gorged with anchor ice from about one-half mile above the gage to the dam 2 miles below the gage. Gage height to top of ice, 7.33 feet; thickness of ice, 0.2 foot.
[e] Wading measurement about 800 feet above gage.

Daily gage height, in feet, of Sacandaga River at Northville, N. Y., for 1907–8.

[E. E. Parkes, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	0.84	2.88	3.63	2.38	16	.....	1.90	2.88	3.04	5.68
2	.....	.84	2.38	3.38	2.40	17	.....	1.78	2.73	2.96	5.18
3	.....	.98	2.13	(a)	2.34	18	.....	1.60	2.60	2.86	4.53
4	.....	1.55	2.23	(a)	2.30	19	.....	1.52	2.48	2.85	6.38
5	.....	1.95	3.33	4.90	3.76	20	.....	1.48	2.40	2.76	6.83
6	.....	2.13	2.83	4.60	4.08	21	.....	1.53	2.38	2.78	7.28
7	.....	1.90	2.58	9.68	3.98	22	.....	1.56	2.33	2.96	6.83
8	.....	1.88	3.38	8.32	4.08	23	.....	1.48	2.23	3.46	8.23
9	.....	1.52	(a)	5.86	3.98	24	0.86	1.68	2.18	2.87	7.48
10	.....	1.98	4.18	4.98	5.88	25	.86	2.03	2.13	2.86	6.48
11	.....	1.88	3.68	4.58	6.28	26	.86	1.98	2.08	2.80	4.68
12	.....	3.44	4.18	4.18	4.98	27	.88	1.80	2.06	2.70	4.18
13	.....	2.70	3.83	3.64	4.08	28	.88	1.70	(a)	2.64	4.08
14	.....	2.28	3.48	3.64	3.98	29	.88	1.83	(a)	2.66	5.20
15	.....	2.00	3.18	3.36	6.78	30	.82	3.36	4.88	2.48	5.10
						31	.84	.....	4.08	.....	6.25

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.[b]												
1	4.55	.....	.....	.....	9.20	4.10	1.30	1.10	0.80	1.26	1.48	1.88
2	5.10	.....	.....	.....	8.92	3.30	1.25	1.50	.78	1.26	1.31	1.94
3	3.70	.....	.....	.....	7.95	3.32	1.22	1.25	.78	1.36	1.31	2.56
4	3.50	.....	.....	.....	6.98	3.40	1.22	1.00	.80	1.18	1.26	2.46
5	5.25	.....	.....	.....	6.25	3.30	1.20	1.50	.80	1.08	1.21	1.96
6	8.20	.....	.....	4.20	5.75	3.60	1.22	1.15	.75	1.06	1.16	1.88
7	8.10	.....	.....	.....	6.08	3.30	1.25	1.25	.78	1.21	1.21	1.96
8	8.45	.....	.....	5.00	6.02	2.32	1.40	1.25	.78	.96	1.24	6.76
9	8.20	.....	.....	8.00	6.70	1.92	1.42	1.20	.76	.96	1.19	5.56
10	7.20	.....	.....	7.00	5.82	2.02	1.28	1.12	.75	.96	1.18	5.26
11	7.00	.....	.....	.....	5.51	1.98	1.22	1.10	.71	1.06	1.16	.....
12	8.20	.....	.....	.....	6.02	1.80	1.20	1.12	.71	1.36	1.86	.....
13	7.00	.....	.....	.....	5.00	1.75	1.00	1.10	.71	1.26	1.86	.....
14	6.20	.....	.....	.....	5.52	1.65	1.75	1.50	.71	1.16	1.66	.....
15	5.80	.....	.....	.....	6.18	1.70	1.10	1.00	.66	1.06	1.61	.....
16	6.00	.....	.....	.....	5.92	2.55	1.25	.95	.66	1.06	1.46	.....
17	6.30	.....	.....	5.40	5.00	1.92	1.25	.95	.66	1.00	1.51	.....
18	6.00	.....	.....	.....	4.90	1.75	1.48	1.48	.66	.96	1.51	.....
19	5.30	.....	.....	.....	5.60	1.60	2.28	1.13	.66	.96	1.46	.....
20	4.70	.....	.....	.....	5.30	2.30	1.90	1.23	.63	.96	1.51	.....
21	5.10	.....	.....	.....	4.40	2.02	1.56	1.10	.63	.91	1.51	.....
22	5.40	.....	.....	.....	4.85	1.95	1.60	.95	.63	.91	1.56	.....
23	5.20	.....	.....	.....	4.62	1.82	1.55	.93	.63	.91	1.68	.....
24	4.70	.....	.....	.....	4.50	1.78	1.40	.98	.66	.87	1.58	.....
25	4.40	.....	.....	.....	4.00	1.62	1.32	.95	.66	.96	1.86	.....
26	5.10	.....	.....	8.10	3.90	1.50	1.40	.80	.66	.96	2.51	.....
27	.....	.....	.....	9.82	3.65	1.40	1.35	.85	.66	1.91	2.58	.....
28	.....	.....	.....	8.92	3.12	1.35	1.28	.83	.66	2.06	2.36	.....
29	.....	.....	.....	8.50	4.00	1.32	1.55	.83	1.36	2.26	2.07	.....
30	.....	.....	.....	8.95	3.90	1.30	1.30	.80	1.58	2.06	2.46	.....
31	.....	.....	.....	.....	4.30	.....	1.28	.80	.....	1.76	.....	.....

[a] Gage height over the top of the gage, 5 feet. Conditions of flow affected by ice conditions December 5 to 9, 15 to 20, and 22 to 23, 1907. The remainder of December, 1907, assumed unaffected by ice.

[b] Observations discontinued January 27 to April 5 and December 11 to 31, 1908, on account of poor winter conditions due to river packing with anchor and shell ice. Conditions of flow also affected by anchor ice January 1 to 26 and December 1 to 10, 1908.

The gage was carried away by the ice March 30, 1908. Readings April 6 to June 26 estimated from observer's readings, which were based on temporary reference points and the gage heights at Wells and Hadley. The record during this period is very uncertain.

Rating table for Sacandaga River at Northville, N. Y., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.60	32	2.00	590	3.40	2,010	5.60	5,870
.70	47	2.10	660	3.50	2,150	5.80	6,310
.80	65	2.20	735	3.60	2,290	6.00	6,770
.90	87	2.30	815	3.70	2,440	6.20	7,250
1.00	112	2.40	900	3.80	2,590	6.40	7,750
1.10	140	2.50	990	3.90	2,750	6.60	8,270
1.20	170	2.60	1,085	4.00	2,910	6.80	8,810
1.30	205	2.70	1,185	4.20	3,230	7.00	9,370
1.40	245	2.80	1,290	4.40	3,570	8.00	12,430
1.50	290	2.90	1,400	4.60	3,910	9.00	15,850
1.60	340	3.00	1,510	4.80	4,270	10.00	19,600
1.70	395	3.10	1,630	5.00	4,650		
1.80	455	3.20	1,750	5.20	5,040		
1.90	520	3.30	1,880	5.40	5,450		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 18 discharge measurements made during 1907–1909, and is well defined. The above table has been revised and differs slightly from that published in Fourth Annual Report of the state water-supply commission of New York.

Monthly discharge of Sacandaga River at Northville, N. Y., for 1907–8.

[Drainage area, 740 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
August 24–31	83	69	78.2	0.106	0.03	B.
September	2,070	74	550	.743	.83	B.
October	7,000	632	2,000	2.70	3.11	A.
November	18,400	972	3,420	4.62	5.16	A.
December	10,800	750	3,050	4.12	4.75	C.
1908.						
January			1,430	1.93	2.22	C.
February			2,660	3.59	3.87	C.
March			2,880	3.89	4.48	C.
April	18,900		9,600	13.0	14.50	C.
May	16,600	1,650	6,040	8.16	9.41	C.
June	3,070	205	862	1.16	1.29	C.
July	799	112	252	.341	.39	A.
August	290	65	144	.195	.22	A.
September	330	36	63.9	.086	.10	B.
October	783	80	208	.281	.32	A.
November	1,170	158	389	.526	.59	A.
December			446	.603	.70	C.
The year	18,900	36	2,080	2.81	38.09	

NOTE.—Discharge January to April, 1908, and December, 1907 and 1908, also missing days 1907, estimated on the basis of Sacandaga at Hadley. Values for April and May are probably somewhat too large. Discharge December 5 to 9, 1907, 770 second-feet; December 15 to 23, 1907, 1,840 second-feet. (See rating-table footnote.)

SACANDAGA RIVER NEAR HADLEY, N. Y.

This station is located on the steel highway bridge about 2½ miles west of Hadley, where the Sacandaga enters the Hudson, between the towns of Corinth and Hadley. It was established September 13, 1907, in cooperation with the New York state water-supply commission, to obtain general statistical and comparative data regarding the flow of the Sacandaga River, which has important storage and power possibilities.

The nearest dam is at Conklingville, about 3½ miles upstream, and is partially washed away and not in use at present. Occasional log jams occur in the vicinity of this station, causing backwater. (See Pl. V, *A*.) The discharge is somewhat affected by ice during the winter months.

The datum of the gage has remained the same during the maintenance of the station. Conditions for obtaining the accurate discharge are fair, except during the existence of log jams. The rating curve is not well defined.

Information in regard to this station is contained in the annual report of the state water-supply commission of New York.

Discharge measurements of Sacandaga River near Hadley, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 27 [a]	Barrows and Hoyt	80	80.4	0.90	130
September 13	do	263	551	2.78	2,150
October 4	J. B. Pierson	240	447	2.35	1,690
October 5 [b]	do	194	642	2.77	1,810
October 16 [b]	do	250	886	2.80	1,680
October 17 [b]	do	250	892	2.80	1,680
October 25 [b]	do	200	649	2.23	895
Do. [b]	do	200	649	2.23	914
November 19 [b]	do	250	942	2.88	1,970
December 16	do	120	898	3.50	3,930
1908.					
January 4	J. B. Pierson	120	916	3.80	4,510
January 24	Wood and Pierson	115	617	2.37	1,150
June 24	D. M. Wood	106	466	2.1±	524
July 3	G. W. Brett	104	442	1.86	348
July 17 [b]	do	195	381	1.65	213
August 5 [b]	Brett and Allen	187	372	1.51	215
Do. [c]	do	144	364	1.51	183
September 17 [a]	D. M. Wood	95	85.4	1.11	122
October 27	Wood and French	108	544	2.43	660
December 30 [d]	C. R. Adams	100	518	2.68	477

[a] Wading measurement about 3,000 feet above the gage.
[b] Measurement made from a boat about 1 mile below the gage.
[c] Measurement made 200 feet below boat section.
[d] Partial ice conditions.

NOTE.—All the above measurements, although accurately made, are very inconsistent, owing to log jams, ice conditions, and changing conditions of flow at this station.

Daily gage height, in feet, of Sacandaga River near Hadley, N. Y., for 1907–8.

[W. W. Jeffers, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1907.					1907.				
1		2.9	4.05	2.35	16	2.05	2.85	3.7	3.45
2		2.7	3.9	2.3	17	1.95	2.75	3.4	3.25
3		2.45	4.05	2.3	18	1.8	2.6	3.0	3.15
4		2.35	4.5	2.25	19	1.75	2.4	2.8	3.0
5		2.9	4.7	2.2	20	1.7	2.35	2.75	2.9
6		3.0	4.45	2.15	21	1.65	2.35	2.6	2.85
7		2.85	4.6	2.1	22	1.6	2.25	2.65	2.8
8		2.9	4.65	2.15	23	1.65	2.25	2.7	3.05
9		3.7	5.6	2.3	24	1.75	2.2	2.75	3.5
10		3.75	5.35	2.55	25	1.9	2.15	2.7	3.85
11		3.7	4.8	3.8	26	2.05	2.1	2.6	4.05
12		3.6	4.55	4.7	27	2.0	2.1	2.55	4.2
13	2.75	3.5	4.35	4.55	28	1.95	2.9	2.5	4.0
14	2.6	3.15	4.0	4.15	29	2.0	4.3	2.45	4.05
15	2.25	2.95	3.8	3.7	30	2.6	4.45	2.4	4.25
					31		4.4		4.4

Daily gage height, in feet, of Sacandaga River near Hadley, N. Y., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	4.4	3.9	2.85	5.85	6.35	.....	1.95	1.65	1.35	1.85	2.25	2.6
2	4.3	.....	2.7	5.55	6.25	.....	1.9	1.55	1.3	2.0	2.4	2.6
3	4.2	.....	2.7	5.2	6.2	.....	1.9	1.45	1.25	2.0	2.3	2.5
4	3.85	.....	2.65	4.85	6.1	.....	1.85	1.45	1.25	1.9	2.3	2.4
5	3.65	.....	2.6	4.55	6.0	.....	1.9	1.5	1.2	1.85	2.15	2.25
6	3.3	.....	2.55	4.35	5.95	.....	1.85	1.55	1.2	1.75	2.0	2.1
7	3.05	.....	2.5	4.45	5.8	.....	1.9	1.65	1.15	1.75	1.9	2.15
8	2.85	.....	2.4	4.9	5.65	.....	1.9	1.7	1.15	1.7	1.85	2.3
9	2.75	.....	2.3	5.3	5.45	.....	1.95	1.75	1.15	1.6	1.85	2.4
10	2.7	.....	2.2	5.45	5.3	.....	1.9	1.75	1.15	1.45	1.9	2.4
11	2.6	.....	2.45	5.6	5.15	.....	1.85	1.65	1.15	1.35	1.95	2.5
12	2.6	.....	2.7	5.65	5.0	.....	1.8	1.6	1.15	1.65	2.0	2.65
13	2.7	.....	3.05	5.8	4.95	.....	1.75	1.55	1.15	1.65	2.1	2.8
14	2.8	.....	3.35	5.95	4.8	.....	1.7	1.55	1.1	1.8	2.15	2.8
15	2.7	.....	3.5	5.9	4.65	.....	1.65	1.45	1.1	1.8	2.2	2.7
16	2.6	7.3	3.55	5.8	4.5	.....	1.65	1.45	1.1	1.6	2.2	2.7
17	2.55	4.8	3.6	5.55	4.25	.....	1.7	1.45	1.05	1.55	2.15	2.6
18	2.5	4.65	3.5	5.4	4.1	.....	1.85	1.5	1.05	1.55	2.15	2.6
19	2.45	4.55	3.4	5.1	3.95	.....	2.15	1.55	1.05	1.5	2.1	2.5
20	2.4	4.35	3.35	4.85	3.85	.....	2.4	1.6	1.05	1.5	2.1	2.5
21	2.35	4.15	3.3	4.45	3.7	.....	2.4	1.55	1.05	1.45	2.1	2.5
22	2.3	3.95	3.4	4.55	3.65	.....	2.3	1.5	1.05	1.45	2.1	2.55
23	2.25	3.8	3.4	4.9	3.6	.....	2.25	1.45	1.05	1.45	2.15	2.6
24	2.2	3.65	3.55	5.3	.....	.....	2.05	1.45	1.05	1.4	2.2	2.6
25	2.2	3.5	3.75	5.65	.....	2.05	1.95	1.45	1.05	1.4	2.3	2.65
26	2.1	3.35	3.95	5.8	.....	2.1	1.85	1.45	1.05	1.45	2.4	2.7
27	2.0	3.15	4.15	5.95	.....	2.15	1.85	1.45	1.05	2.12	2.5	2.7
28	2.15	3.1	4.5	6.3	.....	2.05	1.85	1.4	1.05	2.7	2.6	2.7
29	2.3	2.95	5.05	6.45	.....	2.0	1.9	1.4	1.5	2.8	2.7	2.7
30	2.7	.....	5.75	6.45	.....	1.95	1.8	1.4	1.65	2.85	2.7	2.7
31	3.5	.....	6.15	.....	.....	.....	1.75	1.35	.....	2.95	.....	2.6

NOTE.—River frozen February 2 to 15, and December 13 to 31, 1908. Conditions of flow may also have been affected more or less by ice during January to March. No observations made May 24 to June 24 on account of log jam at the gage. June 25 to July 3, observations were made from a temporary reference point on the bridge. Conditions of flow were affected after July 2 by a log jam near the bridge.

Rating tables for Sacandaga River at Hadley, N. Y.

SEPTEMBER 13, 1907, TO MAY 23, 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*	*Feet.*	*Sec.-feet.*
1.00	150	2.20	870	3.40	3,060	5.20	9,320
1.10	180	2.30	990	3.50	3,320	5.40	10,180
1.20	210	2.40	1,120	3.60	3,590	5.60	11,060
1.30	250	2.50	1,260	3.70	3,870	5.80	11,970
1.40	290	2.60	1,410	3.80	4,160	6.00	12,890
1.50	340	2.70	1,570	3.90	4,460	6.20	13,810
1.60	400	2.80	1,740	4.00	4,770	6.40	14,730
1.70	460	2.90	1,920	4.20	5,420	6.60	15,670
1.80	520	3.00	2,120	4.40	6,110	6.80	16,610
1.90	590	3.10	2,340	4.60	6,850	7.00	17,550
2.00	670	3.20	2,570	4.80	7,640	8.00	22,350
2.10	760	3.30	2,810	5.00	8,470	9.00	27,250

NOTE.—This table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1907–9, and is not well defined. The above table has been revised and differs slightly from that published in the fourth annual report of the state water supply commission of New York on the basis of additional data more recently available.

MAY 24, 1908, TO DECEMBER 31, 1908.

0.80	75	1.40	195	2.00	410	2.60	775
.90	90	1.50	225	2.10	460	2.70	850
1.00	105	1.60	255	2.20	515	2.80	940
1.10	125	1.70	290	2.30	575	2.90	1,035
1.20	145	1.80	325	2.40	640	3.00	1,150
1.30	170	1.90	365	2.50	705		

NOTE.—This table is applicable only during the periods when the discharge was affected by log jams. It is based on 7 discharge measurements made during 1908, and is fairly well defined between gage heights 1.1 feet and 2.4 feet.

Monthly discharge of Sacandaga River at Hadley, N. Y., for 1907–8.

[Drainage area, 1,050 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
September 13 to 30	1,660	400	736	0.701	0.47	C.
October	6,290	760	2,260	2.15	2.48	C.
November	11,100	1,120	4,160	3.96	4.42	B.
December	7,240	760	3,040	2.90	3.34	C.
1908.						
January	6,110	670	1,900	1.81	2.09	C.
February	[a] 25,000	.....	3,420	3.26	3.52	C.
March	13,600	870	3,480	3.31	3.82	C.
April	15,000	5,940	10,200	9.71	10.83	C.
May	14,500	.....	7,440	7.09	8.17	C.
June	.....	388	1,300	1.24	1.38	C.
July	640	272	382	.364	.42	C.
August	308	182	233	.222	.26	C.
September	272	115	138	.131	.15	D.
October	1,090	182	367	.350	.40	D.
November	850	345	521	.496	.55	C.
December	921	442	637	.607	.70	C.
The year	25,000	115	2,500	2.38	32.29	

[a] Estimated. See rating table foot-note.

BATTENKILL RIVER AT BATTENVILLE, N. Y.

This temporary station was located at the covered highway bridge at Battenville just below the mill of the Phoenix Paper Company, and about 5 miles from Greenwich. It was established September 24, 1908, discontinued December 12, 1908, and reestablished July, 1909.

The station was maintained to obtain data regarding the low-water flow of Battenkill River.

Whitaker Brook enters about 1½ miles above the station. Power is developed at a number of places on this river, the nearest being about 1,500 feet above the station. At East Greenwich, 3½ miles farther up, is another dam. Below, there are dams at Center Falls and Greenwich, 2½ and 5 miles distant, respectively.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Battenkill River at Battenville, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
September 23	C. R Adams	55	51.7	5.77	82.3
October 28	do	57	60.6	5.80	108

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Battenkill River at Battenville, N. Y., for 1908.

[Wm. R. Hobbie, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	5.81	5.85	5.85	16	.....	5.86	6.00	.....
2	.....	5.78	5.96	5.77	17	.....	5.84	5.90	.....
3	.....	5.84	5.89	5.78	18	.....	5.82	5.87	.....
4	.....	5.82	5.86	5.73	19	.....	5.82	5.82	.....
5	.....	5.95	5.86	5.78	20	.....	5.84	5.82	.....
6	.....	5.83	5.95	5.89	21	.....	5.88	5.90	.....
7	.....	5.78	5.82	5.91	22	.....	5.81	5.90	.....
8	.....	5.76	5.84	6.06	23	5.77	5.82	5.88	.....
9	.....	5.74	5.88	.....	24	.....	5.80	5.87	.....
10	.....	5.78	5.86	.....	25	5.73	5.73	5.92	.....
11	.....	5.85	5.78	.....	26	5.78	5.70	6.05	.....
12	.....	6.06	5.87	.....	27	5.60	5.74	6.14	.....
13	.....	5.94	6.11	.....	28	5.74	5.80	6.04	.....
14	.....	5.94	5.90	.....	29	5.76	5.91	6.06	.....
15	.....	5.89	5.88	.....	30	5.79	6.02	5.98	.....
					31	.....	5.95	.....	.....

NOTE.—River frozen December 9.

FISH CREEK AT BURGOYNE, N. Y.

This temporary station was located at Brandt's bridge at Burgoyne, N. Y. It was established August 25, 1904, and discontinued June 30, 1905; was re-established August 28, 1908, and again discontinued November 30, 1908.

It has been maintained to obtain data regarding the low water flow of Fish Creek, which is the outlet of Saratoga Lake, and an important stream for power.

The station is about 6¼ miles above the junction of Fish Creek with the Hudson. Above the station is Saratoga Lake, which serves as a storage basin, the main portion being about 4½ miles distant.

There is no relation between the gage datum used in 1904 and that used in 1908.

The records obtained during 1908 are fairly good, although based upon very few discharge measurements. The station is not suitable for permanent records owing to the prevalence during the summer and fall of grass and aquatic plants in the channel.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Fish Creek at Burgoyne, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 28	Geo. M. Brett	82.5	183	0.87	88.4
September 22	C. R. Adams	83	171	.60	66.9
October 29	do	83	197	.92	128

Daily gage height, in feet, of Fish Creek at Burgoyne, N. Y., for 1908.

[Frank E. Ward, observer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.85	0.65	1.25	0.95	16	.....	0.75	0.65	0.9	1.0
2	.....	.85	.65	1.1	1.0	17	.....	.75	.65	.85	1.1
3	.....	.85	.65	1.05	.95	18	.....	.75	.8	.85	1.0
4	.....	.95	.75	1.0	.85	19	.....	.55	.7	.85	1.0
5	.....	.95	.55	1.0	.85	20	.....	.6	.65	.85	1.2
6	.....	.95	.55	1.0	1.0	21	.....	.6	.65	.85	1.1
7	.....	.9	.55	1.0	.9	22	.....	.6	.65	1.1	1.0
8	.....	.85	.55	1.1	1.0	23	.....	.6	.65	.9	1.0
9	.....	.85	.55	.85	.95	24	.....	.55	.65	.9	.....
10	.....	.85	.55	.8	.85	25	.....	.55	.75	.9	.....
11	.....	.85	.9	.85	.95	26	.....	.6	.75	1.1	.....
12	.....	.8	.7	.95	1.0	27	.....	.75	.75	.95	.....
13	.....	.75	.6	.95	1.2	28	0.9	.6	.9	.95	.....
14	.....	.8	.65	.85	1.1	29	.95	.65	.95	1.1	.....
15	.....	.75	.65	1.1	1.0	30	.9	.65	.95	.9	.....
						31	.85	.....	1.05	.....	.....

Rating table for Fish Creek at Burgoyne, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.50	51	0.70	77	0.90	112	1.10	157
0.60	63	0.80	93	1.00	133	1.20	183

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on 3 discharge measurements made during 1908 and is only approximate.

Monthly discharge of Fish Creek at Burgoyne, N. Y., for 1908.

[Drainage area, 236 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
September	122	57	88	0.373	0.42	C.
October	145	57	78.9	.334	.39	C.
November	197	93	126	.534	.60	C.
December 1 to 23	183	102	134	.568	.49	C.

HOOSIC RIVER BASIN.

DESCRIPTION.

Hoosic River rises on the west slope of the Hoosac Mountains in Vermont and Massachusetts. Two head branches, one flowing southward and the other northward along the west slope of this range, unite at North Adams, Mass., and the stream then flows northwestward, entering the Hudson 3 miles north of Mechanicville. Above Buskirk the drainage basin is rugged and precipitous, the distribution of tributaries affording rapid concentration of the run-off from the steep rock slopes. The ridges are sparsely wooded. The soil in the

valleys is generally firm and tenacious. The general elevation of the valley at the junction of the headwaters is 1,000 feet. Numerous dams, affording power for textile, agricultural implement, and other industries, are scattered throughout the length of the stream from North Adams to Schaghticoke. The drainage basin contains no important lakes and but one storage reservoir, at Farnam, near the head of the South Branch.

South of Hoosic River the state boundary follows the Taconic Ridge, which forms the divide between the Hoosic in Massachusetts and the Little Hoosic in New York.

HOOSIC RIVER AT BUSKIRK, N. Y.

This station is located at the highway bridge in Buskirk, N. Y., and was established September 25, 1903.

It has been maintained to obtain data regarding the flow of this stream, the records being of especial value because of the considerable amount of water power, both developed and unutilized.

Walloomsac River enters about 5 miles above this station; but there are no large tributaries downstream in a distance of about 17 miles to the mouth, except Tomhannock Creek.

Numerous dams are scattered throughout the length of the river from North Adams to Schaghticoke, the first one above Buskirk being at Hoosic Falls, 7 miles distant. During the winter months the discharge is considerably affected by the presence of ice.

The datum of the gage has remained the same during the maintenance of the station. Conditions for obtaining the accurate discharge are good, and a very good rating curve has been developed.

Information in regard to this station is contained in the annual reports of the state water supply commission, of New York, and of the state engineer and surveyor, State of New York.

Discharge measurements of Hoosic River at Buskirk, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 24	Wood and Hoyt	124	393	1.97	386
September 7	W. G. Hoyt	124	411	2.19	429
December 24	D. M. Wood	142	1,020	6.54	4,870
1908.					
January 20	Wood and Pierson	112	428	2.46	700
February 28 [a]	D. M. Wood	125	473	2.71	822
May 4	do	132	612	3.84	1,830
August 8	Brett and Allen	128	444	2.30	610
September 21 [b]	D. M. Wood	51	49.9	1.30	85.9
October 28	Wood and French	121	376	1.80	239
December 30 [c]	D. M. Wood	108	188	1.92	87.8

[a] Considerable needle ice; river frozen somewhat.
[b] Measurement made by wading.
[c] Measurement made under ice conditions about 200 feet below the bridge. Average thickness of ice, 0.8 foot; gage height to top of ice, 2.02 feet. Some anchor ice.

Daily gage height, in feet, of Hoosic River at Buskirk, N. Y., for 1907–8.

[John V. Henry, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	5.55	.....	.....	4.25	3.7	2.35	3.25	2.0	1.4	3.1	4.25	2.3
2	4.7	.....	.....	3.6	3.5	2.35	2.65	2.2	1.5	2.7	4.15	2.35
3	3.9	.....	.....	3.3	3.1	3.2	2.45	3.2	1.65	2.5	6.55	2.35
4	5.65	.....	.....	3.15	3.15	3.75	2.2	2.0	1.9	3.45	4.9	2.4
5	4.95	.....	.....	3.5	3.35	3.1	2.2	1.95	3.5	3.65	4.05	2.1
6	3.7	.....	.....	3.6	3.15	3.5	2.0	1.8	2.65	3.15	3.85	2.35
7	3.65	.....	.....	3.05	3.1	3.35	2.65	1.9	2.0	2.9	8.9	2.45
8	4.05	.....	.....	3.0	3.45	3.25	2.1	1.75	1.75	3.9	5.9	2.25
9	4.6	.....	.....	2.85	3.25	3.0	1.9	1.75	1.9	4.15	4.8	2.25
10	3.5	.....	.....	2.9	3.05	2.6	1.9	1.7	1.9	3.3	4.3	4.9
11	3.5	.....	.....	2.75	2.95	2.7	1.9	1.6	1.9	3.0	4.2	7.1
12	3.25	.....	.....	2.95	3.1	2.6	3.1	1.6	2.5	4.4	3.75	4.6
13	2.8	.....	.....	2.7	2.75	2.55	3.4	1.7	2.0	3.65	3.45	3.65
14	2.9	.....	.....	3.15	2.55	2.4	3.2	1.5	1.85	3.3	3.35	3.5
15	2.6	.....	4.65	3.25	2.4	2.3	2.55	1.7	1.7	3.0	3.3	3.15
16	2.3	.....	3.7	3.15	2.6	2.25	2.2	1.4	1.75	2.85	3.1	3.3
17	3.45	.....	3.45	3.1	4.7	2.25	2.15	1.5	1.75	2.75	2.9	3.15
18	4.5	.....	3.55	3.15	3.6	2.2	2.4	1.5	1.7	2.6	2.9	3.25
19	4.55	.....	3.3	2.75	3.25	2.15	2.3	1.6	1.8	2.45	2.9	2.95
20	.....	.....	2.9	2.75	3.2	2.3	2.2	1.6	1.8	2.3	2.75	2.85
21	.....	.....	2.75	2.55	2.95	2.2	4.45	1.55	1.8	2.7	2.7	2.75
22	.....	.....	2.85	2.8	2.65	2.2	3.0	1.6	1.65	2.5	2.7	2.7
23	.....	.....	3.6	2.9	2.65	1.95	2.7	1.45	2.1	2.35	2.75	3.1
24	.....	.....	4.1	4.2	2.55	2.05	2.5	1.6	3.65	2.3	2.5	6.1
25	.....	.....	3.5	4.05	2.45	1.8	5.5	1.35	3.05	2.2	2.6	4.35
26	.....	.....	3.4	3.85	2.35	2.1	3.45	1.5	2.4	2.15	2.5	3.85
27	.....	.....	3.5	5.2	2.65	2.5	2.55	1.55	2.2	2.2	2.5	3.5
28	.....	.....	5.05	4.2	2.55	2.15	2.25	1.55	2.2	6.0	2.45	3.6
29	.....	.....	6.1	3.55	2.5	2.1	2.2	1.55	2.8	8.8	2.6	3.8
30	.....	.....	6.4	3.85	2.3	2.6	2.05	1.5	3.7	7.55	2.45	3.6
31	.....	.....	5.15	.....	2.35	.....	2.1	1.6	.....	5.05	.....	4.0
1908.[b]												
1	3.5	3.55	2.3	4.1	4.65	3.15	1.8	1.85	1.8	1.65	1.5	1.5
2	3.3	3.45	2.9	4.0	4.05	2.75	1.8	1.8	1.75	1.5	1.5	1.4
3	3.15	3.2	3.1	3.6	4.05	2.55	1.75	1.55	1.65	1.45	1.55	1.45
4	2.85	3.35	2.7	3.05	3.9	2.35	1.7	1.75	1.5	1.6	1.65	1.5
5	2.8	3.15	2.55	2.95	3.55	2.2	1.7	1.9	1.6	1.5	1.5	1.5
6	2.65	3.15	2.45	3.15	3.3	2.05	1.9	3.0	1.45	1.6	1.45	1.4
7	2.85	3.3	2.5	3.4	3.35	2.1	1.8	2.3	1.5	1.6	1.55	1.55
8	3.05	3.35	2.25	3.7	5.65	2.1	1.65	2.3	1.6	1.55	1.5	2.35
9	2.95	3.1	2.5	5.5	6.2	2.1	1.75	2.0	1.55	1.5	1.45	2.1
10	2.9	3.15	2.35	4.4	5.15	2.1	1.6	1.85	1.65	1.5	1.6	2.95
11	2.7	3.2	2.5	4.3	4.4	1.95	1.9	1.85	1.6	1.6	1.5	2.8
12	2.85	3.25	4.35	4.05	3.9	1.95	1.5	1.85	1.5	1.5	1.6	2.9
13	5.3	3.25	4.9	3.85	3.6	2.0	1.6	1.9	1.45	1.5	1.55	2.65
14	3.75	3.55	6.1	3.55	4.05	1.9	1.75	1.8	1.45	1.55	1.5	2.5
15	3.05	10.9	4.6	3.6	4.05	1.9	1.8	1.85	1.45	1.4	1.5	2.65
16	2.9	7.55	5.15	4.85	3.6	3.35	1.75	1.85	1.55	1.5	1.6	2.55
17	2.75	4.2	3.6	3.9	3.3	2.65	1.75	1.95	1.6	1.55	1.6	2.0
18	2.75	3.35	3.35	3.7	3.25	2.25	1.7	3.1	1.5	1.4	1.7	1.95
19	2.7	3.1	3.1	4.8	3.05	2.05	1.9	2.3	1.5	1.35	1.65	2.0
20	2.4	3.0	2.9	4.3	2.85	2.05	1.85	2.1	1.3	1.5	1.6	2.05
21	2.55	2.85	2.65	3.9	2.8	1.9	1.75	1.95	1.25	1.45	1.65	2.25
22	2.65	3.0	2.8	3.65	2.9	1.8	2.3	1.95	1.55	1.3	1.5	2.05
23	2.8	2.65	3.0	3.55	2.35	1.95	2.4	2.0	1.55	1.4	1.55	2.05
24	2.4	2.7	5.7	3.7	2.7	1.95	1.95	1.95	1.35	1.35	1.6	2.1
25	2.6	2.75	4.55	3.65	2.75	2.65	3.0	1.95	1.3	1.3	1.7	2.05
26	2.75	2.65	3.85	4.05	2.7	2.3	3.0	1.85	1.4	1.25	1.65	2.25
27	2.7	3.0	5.35	3.7	2.85	2.0	2.35	1.85	1.35	1.5	1.55	2.05
28	2.7	2.75	5.85	4.6	2.6	1.9	1.95	1.75	1.25	1.7	1.5	2.15
29	2.65	2.5	6.9	3.9	2.4	1.75	1.9	1.8	1.5	1.75	1.4	2.25
30	3.45	.....	5.55	3.65	2.8	1.85	1.85	1.75	1.55	1.8	1.6	2.15
31	3.5	.....	4.6	.....	3.6	.....	1.85	1.5	.....	1.7	.....	2.2

[a] River frozen January 19 to March 14, 1907. Anchor ice reported running January 8 and 16, 1907. Discharge also probably affected by ice conditions January 17 to 19, 1907.

[b] Ice conditions prevailed from about January 30 to February 15, and December 4 to 31. Gage heights during the frozen period were taken to water surface in a hole in the ice.

Rating table for Hoosic River at Buskirk, N. Y., for 1903 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.20	74	2.70	837	4.20	2,265	6.40	5,180
1.30	106	2.80	909	4.30	2,380	6.60	5,480
1.40	140	2.90	985	4.40	2,495	6.80	5,780
1.50	176	3.00	1,065	4.50	2,615	7.00	6,080
1.60	216	3.10	1,149	4.60	2,735	7.20	6,390
1.70	260	3.20	1,236	4.70	2,860	7.40	6,700
1.80	308	3.30	1,326	4.80	2,985	7.60	7,010
1.90	359	3.40	1,419	4.90	3,110	7.80	7,320
2.00	412	3.50	1,515	5.00	3,240	8.00	7,630
2.10	467	3.60	1,614	5.20	3,500	9.00	9,230
2.20	524	3.70	1,716	5.40	3,770		
2.30	582	3.80	1,822	5.60	4,040		
2.40	642	3.90	1,930	5.80	4,320		
2.50	704	4.00	2,040	6.00	4,600		
2.60	769	4.10	2,150	6.20	4,890		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made during 1903–1908, and is well defined.

Monthly discharge of Hoosic River at Buskirk, N. Y., for 1907–8.

[Drainage area, 579 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.[a]						
January	4,110	.....	1,320	2.28	2.63	B.
February	.....	.....	300	.518	.54	D.
March	5,180	.....	1,340	2.31	2.66	B.
April	3,500	736	1,410	2.44	2.72	A.
May	2,860	582	1,080	1.87	2.16	A.
June	1,770	308	758	1.31	1.46	A.
July	3,900	359	875	1.51	1.74	A.
August	1,240	123	277	.478	.55	C.
September	1,720	140	542	.936	1.04	B.
October	8,910	495	1,710	2.95	3.40	A.
November	9,070	673	1,890	3.26	3.64	A.
December	6,240	467	1,550	2.68	3.09	A.
The year	9,070	123	1,090	1.88	25.63	
1908.[b]						
January	3,640	.....	1,030	1.78	2.05	A.
February	6,930	.....	1,120	1.93	2.08	C.
March	5,930	553	2,000	3.45	3.98	A.
April	3,900	1,020	1,960	3.39	3.78	A.
May	4,890	612	1,680	2.90	3.34	A.
June	1,370	284	532	.919	1.03	A.
July	1,060	176	378	.653	.75	B.
August	1,150	176	410	.708	.82	B.
September	308	90	179	.309	.34	C.
October	308	90	183	.316	.36	C.
November	260	140	200	.345	.38	C.
December	.....	.....	130	.225	.26	D.
The year	6,930	90	817	1.41	19.17	

[a] Discharge during the frozen periods 1907 estimated on the basis of comparisons with the discharge of Kinderhook Creek at Rossman.

	Second-feet.
Discharge January 17 to 31, 1907	600
March 1 to 14, 1907	350

[b] Discharge during the frozen periods 1908 estimated partly on the basis of Kinderhook Creek at Rossman.

	Second-feet.
Discharge January 30 to 31	650
February 1 to 14	400
February 15	6,000
December 5 to 31	125

MOHAWK RIVER BASIN.

DESCRIPTION.

Mohawk River, the largest tributary of the Hudson, rises in the sandy hills south of Booneville, in western New York, about 40 miles from the east end of Lake Ontario. Its uppermost tributaries are fed by large springs. The river receives also considerable water brought in from the adjacent Black River drainage basin for the supply of Black River and Erie canals. The Mohawk flows southward until it reaches the city of Rome, at which point it turns toward the east, flowing across the State in a course nearly east until it enters the Hudson at Cohoes, a few miles above Troy. Its total length is about 140 miles, and its drainage area comprises 3,470 square miles. The immediate valley of the Mohawk is broad and open, at many places a mile or two in width, and the flats which border the stream have a rich alluvial soil, finely adapted to the raising of grass, grains, and broom corn. Back from the flats there is a rise, in most places gradual but locally abrupt, to hills which attain altitudes several hundred feet above the stream. The more elevated lands are covered with sandy and gravelly loam. Toward the mouth of the river the valley becomes more contracted and the meadows disappear.

Above Rome the Mohawk flows through a deep gorge in shale rock. From Rome eastward to Little Falls the valley is deeply filled with alluvial deposits, and the flood plains on either side become submerged during freshets, thus acting to some extent as storage reservoirs. At Little Falls the river cuts through a rocky gorge, whose walls rise precipitously 500 or 600 feet.

Below Rome, the fall of the river is small and rather uniform, and the river is characterized by long, quiet reaches with slight riffles; but at Little Falls this uniformity is broken, and the stream descends in a succession of falls about 45 feet in half a mile. The average fall between Rome and the lower aqueduct at Crescent, a distance of 110.7 miles, is 2.43 feet per mile; thence to the level of slack water above Troy dam there is a farther descent of 149.5 feet in 4.4 miles, but of this 105 feet is included within the improved power at Cohoes.

The Erie Canal parallels the Mohawk River and derives a part of its water supply from it. The new barge canal, at present under construction by the State of New York, will utilize by canalization the greater portion of the river between Albany and Utica. The water supply for the new canal in the section between Syracuse and Utica will to a large extent come from the Mohawk. A high dam is to be placed across the Mohawk at Delta, 6 miles north of Rome, forming a large reservoir to supply the summit level of the canal near Rome. This supply will be supplemented by a reservoir on West Canada Creek at Hinckley, discharging by a conduit into Ninemile Creek and thence to the Rome summit level.

Important tributaries of the Mohawk are West and East Canada and Schoharie creeks.

West Canada Creek rises in West Canada Lake, in southwest-central Hamilton County and flows in a southerly direction into the Mohawk at Herkimer. Its drainage area, comprising approximately 583 square miles, contains about 50 small lakes and ponds and a small amount of artificial storage, which, with the numerous swamps and marshes in the region of the headwaters, serve to make the regimen of flow fairly uniform. A considerable part of the basin is timber covered. The underlying rock is granitic gneiss in the upper portion of the basin, with limestone in some places. Heavy accumulations of snow occur during the winter. At Trenton Falls is an important development of the Utica Gas and Electric Company, and there is much undeveloped power on this stream.

East Canada Creek rises in Hamilton County and flows southward between Herkimer and Fulton counties, joining the Mohawk at East Creek. In a general way its drainage basin is similar to that of West Canada Creek, although its flow is less sustained and regular.

Schoharie Creek has its source in the Catskills, about 2 miles east of Tannersville, at an elevation of 1,940 feet. The drainage basin is generally irregular. In places its slopes are almost precipitous, and it is extensively forest covered. The overlying rocks are slaty and allow but a slight depth of percolation. The soil is generally of clay. The total drainage area is 909 square miles.

MOHAWK RIVER AT LITTLE FALLS, N. Y.

There are three dams at Little Falls: The upper one is the state dam diverting water for the supply of the Erie Canal; the lower two are used for water-power development. Records of flow have been kept at the lower (Gilbert's) dam since 1898 by the United States Geological Survey in cooperation with the state engineer department, the results for 1907 being furnished by the latter. The dam is of masonry, planned in the form of a circular arch, and furnishes power for the Astoronga Knitting Mill and the mill of the Little Falls Paper Company. As the gage record is kept at the lower dam the results do not include the diversion at the state dam above the gaging station.

Conditions for obtaining accurate discharge data are fair, and the results are considered to be fairly good.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Daily discharge, in second-feet, of Mohawk River at Little Falls, N. Y., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						1,456	1,975	1,044	[a] 260	3,254	2,299	[a] 2,103
2						[a] 1,084	2,530	1,567	82	1,846	2,058	2,145
3						1,296	2,581	1,803	507	1,276	[a] 4,015	2,081
4						1,307	1,279	[a] 1,388	1,335	3,385	7,453	1,355
5						1,258	1,151	1,118	2,914	5,516	5,758	929
6						2,664	1,126	994	1,943	[a] 3,675	3,995	1,315
7						4,770	[a] 498	1,024	1,335	3,066	13,437	1,329
8						3,460	783	889	[a] 622	5,744	11,705	[a] 1,127
9						[a] 1,862	790	859	977	8,473	9,646	1,621
10						1,574	834	812	1,020	5,164	[a] 5,367	8,824
11						1,523	769	[a] 394	3,514	3,808	4,684	11,594
12						1,566	1,104	677	6,644	4,024	2,704	8,633
13						1,145	1,151	719	4,222	[a] 3,183	2,856	5,991
14						994	[a] 580	1,387	1,732	2,755	2,706	3,591
15						1,258	1,136	922	[a] 2,105	2,063	2,368	[a] 2,512
16						[a] 1,696	834	856	1,190	1,802	1,985	2,423
17						960	863	722	775	1,430	[a] 2,007	2,547
18						987	1,262	[a] 396	898	1,233	2,106	1,949
19						895	1,262	375	775	1,187	1,972	2,087
20						865	1,033	662	737	[a] 1,197	1,974	2,032
21						924	[a] 1,084	658	1,206	1,614	2,231	2,080
22						865	1,061	433	[a] 1,147	1,564	1,417	[a] 1,853
23						[a] 463	1,102	567	1,198	1,380	2,324	3,570
24						945	1,616	254	1,337	1,284	[a] 1,730	8,862
25						951	1,783	[a] 308	1,787	1,245	1,947	8,729
26						951	2,064	299	1,886	1,206	2,100	8,473
27						1,022	1,704	457	1,836	[a] 910	2,101	6,506
28						1,020	[a] 1,038	517	1,443	5,351	2,181	6,691
29						985	970	418	[a] 1,495	6,772	2,111	[a] 6,084
30						[a] 818	936	452	3,391	5,218	2,405	5,737
31						.....	936	325	.....	2,995	.....	6,840

[a] Sunday.

Monthly discharge of Mohawk River at Little Falls, N. Y., for 1907.

[Drainage area, 1,310 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
June	4,770	463	1,390	1.06	1.18
July	2,580	498	1,220	.931	1.07
August	1,800	254	751	.573	.66
September	6,640	82	1,680	1.28	1.43
October	8,470	910	3,020	2.31	2.66
November	13,400	1,420	3,720	2.84	3.17
December	11,600	929	4,250	3.24	3.74

MOHAWK RIVER AT DUNSBACH FERRY, N. Y.

This station was established March 12, 1898, in connection with a system of levels by the United States Board of Engineers on Deep Waterways, by D. J. Howell, who has furnished the earlier portion of the record.

The station is located at the dam of the West Troy Water Company, a short distance above Dunsbach Ferry bridge, 9 miles from the mouth of the river. Records for 1907 and 1908 have been furnished by the state engineer department.

The dam is of granite masonry, with a flat crest, and is in two sections, situated on opposite sides of an island of Hudson River shale. Total length of crest, 560 feet. The dam was rebuilt in 1903.

Conditions for obtaining accurate discharge data are fair, and the records are fairly good. During the winter period ice causes some obstruction.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Daily discharge, in second-feet, of Mohawk River at Dunsbach Ferry, N. Y., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	19,240	2,930	1,870	18,870	13,730	3,760	1,760	1,640	[a] 730	7,430	7,940	[a] 5,060
2	47,460	2,760	1,870	13,730	13,730	[a] 3,430	2,100	1,410	730	7,180	6,680	4,410
3	35,110	[a] 2,760	[a] 1,870	9,560	11,240	3,260	2,600	1,410	730	7,430	[a] 8,440	4,190
4	55,230	2,760	1,640	8,440	9,280	3,100	2,930	[a] 1,520	786	6,930	6,930	4,620
5	35,110	2,760	1,640	8,190	[a] 9,560	3,590	3,430	1,520	2,760	10,400	5,920	5,060
6	[a] 25,820	3,100	1,870	8,190	9,840	4,410	3,100	1,410	5,270	[a] 12,480	11,860	3,980
7	17,420	2,760	1,980	[a] 7,680	9,560	6,420	[a] 2,430	1,760	3,980	8,720	30,940	3,260
8	21,860	2,760	2,100	6,930	9,000	8,720	2,100	1,520	[a] 3,260	8,440	41,380	[a] 2,930
9	17,420	2,430	2,270	6,930	9,280	[a] 7,180	1,870	1,410	2,270	13,420	23,440	3,072
10	12,800	[a] 2,600	[a] 2,270	6,680	8,190	4,840	1,520	1,410	2,100	10,680	[a] 17,760	10,120
11	10,680	2,430	2,100	6,420	7,180	3,980	1,520	[a] 1,180	1,980	3,720	13,730	39,400
12	7,680	2,430	2,100	7,940	[a] 6,420	3,430	2,600	1,066	3,980	9,840	10,400	22,250
13	[a] 6,930	2,430	2,270	9,840	5,920	3,260	3,430	950	10,680	[a] 8,190	9,000	14,040
14	6,680	2,430	2,760	[a] 10,400	5,270	3,100	[a] 2,760	840	7,430	7,180	6,420	10,120
15	6,170	2,100	9,280	10,400	5,060	2,760	2,270	840	[a] 5,700	5,890	5,270	[a] 9,000
16	3,590	2,100	13,730	8,190	4,840	[a] 2,430	2,100	840	3,430	4,840	4,840	7,940
17	3,100	[a] 2,100	[a] 12,800	7,430	5,060	2,100	2,270	786	2,930	3,760	[a] 4,410	6,930
18	2,430	2,100	14,690	6,680	5,060	2,100	2,930	[a] 730	2,430	3,590	4,190	5,700
19	2,430	2,100	13,420	6,420	[a] 4,620	2,100	2,270	730	1,980	2,270	3,760	5,010
20	[a] 4,190	2,100	12,170	5,700	4,620	2,100	2,100	730	1,760	[a] 2,430	3,760	4,474
21	6,930	2,100	12,800	[a] 5,060	4,190	2,100	[a] 2,270	786	1,760	3,590	3,760	3,930
22	5,920	2,100	13,420	4,410	3,980	2,100	2,100	840	[a] 1,870	3,430	4,410	[a] 5,230
23	4,840	1,520	16,740	4,840	3,980	[a] 1,870	1,870	840	2,100	3,260	4,840	4,754
24	4,190	[a] 1,870	[a] 33,700	9,000	3,590	1,640	1,870	840	2,430	2,930	[a] 4,410	14,690
25	3,590	1,870	23,440	20,350	3,260	1,640	1,980	[a] 730	2,930	2,760	3,760	22,640
26	2,270	1,870	19,980	16,060	[a] 3,260	1,520	2,430	730	3,590	2,760	3,590	16,400
27	[a] 2,600	1,870	17,080	29,140	4,190	1,640	3,260	730	3,100	[a] 2,600	3,980	14,040
28	2,930	1,870	21,860	[a] 20,350	7,180	1,640	[a] 2,930	730	2,930	3,100	4,410	13,110
29	3,100	.....	25,820	14,350	5,700	1,410	2,600	730	[a] 3,760	18,500	4,840	[a] 13,420
30	3,260	.....	27,070	11,860	5,060	[a] 1,640	2,100	786	5,270	18,500	5,700	13,110
31	3,100	.....	[a] 25,820	.....	3,980	.....	1,760	840	.....	10,960	.....	12,220
1908.												
1	13,421	2,761	[a] 3,591	17,378	16,741	5,491	1,181	1,641	731	621	[a] 5,701	3,712
2	11,551	[a] 2,761	3,431	15,371	21,091	4,191	1,181	[a] 1,521	676	1,411	5,061	3,347
3	9,519	2,372	4,621	11,551	[a] 19,611	3,761	1,181	1,066	621	1,871	4,191	3,177
4	9,892	2,254	6,931	8,441	17,081	3,431	1,181	951	621	[a] 1,761	3,261	3,017
5	[a] 6,087	2,328	6,171	[a] 10,681	14,691	2,924	[a] 951	951	621	1,521	2,931	3,017
6	4,757	2,431	5,701	12,481	11,551	2,424	951	1,181	[a] 621	1,301	2,761	[a] 2,677
7	3,347	2,250	5,491	14,649	9,001	[a] 2,254	951	1,411	621	1,212	2,601	2,187
8	3,385	2,101	[a] 5,061	21,777	19,981	2,254	841	1,521	621	1,966	[a] 2,431	2,347
9	3,431	[a] 2,101	4,469	29,057	20,637	1,924	951	[a] 1,301	621	2,101	2,101	2,347
10	3,431	2,387	4,444	29,937	[a] 15,977	1,924	1,066	1,181	621	1,761	2,101	2,847
11	3,261	2,347	4,014	26,612	12,717	2,254	1,181	951	621	[a] 1,521	1,981	3,677
12	[a] 3,761	2,342	4,444	[a] 23,441	10,317	2,254	[a] 1,411	951	621	1,362	2,101	5,222
13	4,621	2,931	11,015	25,711	8,917	2,424	1,761	896	[a] 566	1,259	2,101	[a] 5,271
14	6,171	5,061	37,283	12,481	9,477	[a] 2,483	1,641	786	511	1,259	2,101	4,841
15	6,421	7,643	[a] 29,384	11,138	13,337	2,431	1,761	731	511	1,181	[a] 2,271	4,411
16	5,701	[a] 59,158	30,304	10,504	10,317	2,101	1,981	[a] 621	511	951	2,271	3,981
17	4,621	36,492	24,869	10,224	[a] 8,107	2,101	2,931	731	511	951	2,101	3,431
18	4,411	21,777	18,240	9,974	6,337	1,871	2,931	3,261	511	[a] 841	2,101	2,931
19	[a] 3,981	13,062	13,600	[a] 11,551	5,617	1,761	[a] 2,931	5,491	511	807	2,431	2,601
20	3,562	11,220	11,551	14,041	5,407	1,438	2,101	2,601	[a] 511	807	2,431	[a] 2,601
21	3,517	11,192	9,561	12,801	5,187	[a] 1,403	1,871	2,271	511	664	2,431	2,761
22	2,924	10,961	[a] 9,001	10,121	4,977	1,738	1,871	1,981	401	664	[a] 2,761	2,431
23	3,350	[a] 10,121	10,121	8,441	6,931	1,804	1,641	[a] 1,871	401	774	2,761	2,271
24	3,431	7,941	13,731	8,191	[a] 9,841	1,694	1,981	1,521	401	708	2,761	1,981
25	3,431	6,931	22,251	10,121	6,931	1,694	2,761	1,561	401	[a] 1,066	2,931	1,871
26	[a] 3,431	5,701	19,611	[a] 12,171	4,841	1,768	[a] 2,431	1,411	401	1,301	3,261	1,871
27	3,431	4,411	21,461	13,421	5,061	1,641	2,431	1,066	[a] 401	1,871	4,621	[a] 1,871
28	3,101	4,191	24,621	13,421	6,421	[a] 1,411	2,101	951	401	3,761	5,271	1,761
29	3,101	3,761	[a] 22,613	13,421	6,931	1,181	1,981	896	401	5,617	[a] 4,621	1,761
30	2,931	.....	21,777	13,421	6,171	1,411	1,981	[a] 841	401	8,181	4,191	1,871
31	2,761	.....	20,672	.....	[a] 5,701	.....	1,871	731	.....	7,638	.....	1,981

[a] Sunday.

Monthly discharge of Mohawk River at Dunsbach Ferry, N. Y., for 1907–8.

[Drainage area, 3,440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	55,200	2,270	12,400	3.61	4.16
February	3,100	1,520	2,320	.674	.70
March	33,700	1,640	11,000	3.20	3.69
April	29,100	4,410	10,300	2.99	3.34
May	13,700	3,260	6,640	1.93	2.22
June	8,720	1,410	3,110	.904	1.01
July	3,430	1,520	2,360	.686	.79
August	1,760	730	1,040	.302	.35
September	10,700	730	3,160	.919	1.03
October	18,500	2,270	7,170	2.08	2.40
November	41,400	3,590	9,030	2.62	2.92
December	39,400	2,930	9,840	2.86	3.30
The year	55,200	730	6,530	1.90	25.91
1908.					
January	13,400	2,760	4,860	1.41	1.63
February	59,200	2,100	8,650	2.51	2.71
March	37,300	3,430	13,900	4.04	4.66
April	29,900	8,190	14,800	4.30	4.80
May	21,100	4,840	10,500	3.05	3.52
June	5,490	1,180	2,250	.654	.73
July	2,930	841	1,740	.506	.58
August	5,490	621	1,450	.422	.49
September	731	401	529	.154	.17
October	8,180	621	1,890	.549	.63
November	5,700	1,980	3,020	.878	.98
December	5,270	1,760	2,910	.846	.98
The year	59,200	401	5,540	1.61	21.88

WEST CANADA CREEK[a] AT TWIN ROCK BRIDGE, N. Y.

This station, which is located at the highway bridge about 2 miles above Hinkley and about one-half mile below the outlet of Black Creek, was established September 7, 1900, to obtain general statistical and comparative data regarding the flow of West Canada Creek. Data on discharge are obtained by the current-meter method. The gage datum has remained the same during the maintenance of the station.

Several dams on this stream in the vicinity of the gaging station are used for power development, one at Hinkley, about 2 miles downstream, and one near the head of Trenton Falls, about midway between the villages of Prospect and Trenton Falls. The discharge is affected at times by backwater from log jams and the dam at Hinkley. Ice obstructs the channel in the winter months and during this period a special rating curve is used for computing the flow.

The records at this station are furnished by the Consolidated Water Company, of Utica, N. Y.

Information in regard to this station is contained in the annual reports of the state engineer and surveyer, State of New York.

[a] For description of this creek see general description of Mohawk River basin, p. 211.

Daily discharge, in second-feet, of West Canada Creek at Twin Rock Bridge, N. Y., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3,319	560	.....	4,813	6,470	608	777	207	186	1,210	1,010	752
2	5,255	598	237	3,039	4,349	598	1,490	334	176	628	942	718
3	3,433	772	330	2,503	2,685	547	1,053	838	222	603	1,769	826
4	4,876	731	407	2,031	2,103	476	705	578	838	1,689	3,520	478
5	9,056	458	373	2,199	2,477	456	532	357	1,239	2,097	2,850	478
6	6,055	492	305	2,555	1,959	1,245	396	289	737	1,510	2,263	586
7	4,137	492	237	2,154	1,626	1,262	396	348	585	1,310	4,600	570
8	3,319	636	254	1,337	1,479	1,210	308	354	567	4,225	3,160	668
9	4,137	526	237	1,458	1,437	632	238	260	567	4,900	1,850	586
10	1,863	560	220	1,106	1,222	608	222	235	741	2,716	1,828	4,938
11	1,090	492	213	1,222	1,222	656	219	281	973	1,828	1,379	7,714
12	838	424	199	1,773	1,222	608	338	233	3,950	2,271	1,106	6,648
13	904	424	228	1,479	1,260	527	588	620	1,682	1,828	952	8,212
14	712	458	216	1,106	1,318	456	517	400	1,010	1,438	822	7,009
15	636	458	364	988	1,337	425	342	222	1,280	1,111	763	6,120
16	560	356	500	845	651	547	238	180	814	932	705	5,840
17	560	390	543	808	1,183	415	308	196	644	790	699	5,190
18	674	356	492	735	741	317	517	180	608	699	620	4,656
19	712	322	475	684	717	300	314	185	557	614	598	4,076
20	904	322	449	651	644	284	284	196	527	636	802	3,665
21	1,138	288	492	684	578	292	383	191	588	650	822	3,781
22	1,090	254	526	668	588	351	342	168	581	547	668	3,347
23	1,042	220	783	826	557	308	624	165	435	514	705	3,955
24	860	254	1,392	2,175	598	386	405	172	527	517	681	8,766
25	904	220	1,262	3,839	598	238	342	168	818	469	628	6,792
26	598	220	1,301	5,580	466	224	547	154	966	456	591	5,002
27	636	220	1,262	5,548	802	334	547	165	781	517	585	3,520
28	560	220	2,403	4,319	894	425	456	183	640	3,300	557	3,151
29	560	.....	11,720	3,868	802	300	326	176	777	3,600	603	2,955
30	636	.....	9,097	4,046	681	292	231	183	1,682	1,878	557	2,581
31	492	.....	8,212	.....	632	.....	210	176	.....	1,262	.....	4,844
1908.												
1	1,975	364	1,054	2,214	8,608	2,884	314	185	140	305	235	360
2	1,870	432	805	1,950	6,684	3,420	305	200	148	270	218	380
3	2,260	449	1,666	1,430	4,870	1,430	296	178	178	270	170	322
4	1,855	509	1,694	1,100	3,085	950	296	162	192	261	178	305
5	1,855	569	1,498	950	2,415	700	350	178	185	209	170	305
6	1,554	560	1,405	1,374	3,085	530	314	455	209	170	178	296
7	1,457	526	1,301	1,820	1,950	360	305	350	209	170	185	314
8	1,498	492	1,327	4,170	5,080	480	950	314	170	170	192	950
9	1,418	483	1,314	5,792	4,380	296	632	305	170	185	226	820
10	1,174	483	1,054	4,310	3,420	314	226	244	218	218	192	505
11	893	398	1,102	4,100	2,080	288	360	192	218	314	296	480
12	970	407	1,198	4,240	1,885	270	322	178	226	350	900	455
13	1,249	398	1,314	3,085	3,018	244	296	185	244	270	370	564
14	1,102	407	1,596	1,950	2,616	253	288	185	244	200	296	455
15	721	959	1,915	2,348	3,692	261	296	178	235	185	279	370
16	761	(a)	2,751	3,353	2,348	340	(b)	185	226	170	253	360
17	607	(a)	2,502	2,214	1,820	296	(b)	218	226	170	270	305
18	693	3,114	2,240	1,885	1,495	244	(b)	370	218	185	218	305
19	579	2,320	1,945	3,420	2,348	209	(b)	305	140	200	253	288
20	483	1,960	1,540	3,219	1,150	1,262	(b)	244	140	178	270	322
21	432	1,470	1,275	1,950	598	820	(b)	200	140	162	322	305
22	500	1,327	1,186	1,374	900	405	(b)	170	135	148	331	253
23	517	984	1,150	1,430	2,816	314	244	185	135	155	288	253
24	483	926	1,162	4,660	1,150	296	666	185	135	155	279	261
25	398	871	1,327	7,154	2,015	331	740	162	135	178	632	360
26	551	1,054	1,126	7,009	1,560	288	1,495	162	135	200	1,950	305
27	551	1,114	1,353	8,371	2,415	244	950	155	218	218	2,015	314
28	598	1,114	2,130	8,686	1,374	261	480	155	209	244	1,495	305
29	645	1,018	10,918	6,576	1,000	322	370	148	505	322	1,495	296
30	500	.....	7,118	3,556	1,820	322	340	148	360	331	405	279
31	381	.....	4,660	.....	2,348	.....	270	155	.....	261	.....	296

[a] Ice gorge below February 16 and 17, 1908. [b] Repairing Hinkley Dam July 16 to 22, 1908.

Monthly discharge of West Canada Creek at Twin Rock, N. Y., for 1907–8.

[Drainage area, 364 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	9,060	492	1,990	5.47	6.31
February	772	220	419	1.15	1.20
March 2 to 31	11,700	199	1,490	4.09	4.56
April	5,580	651	2,170	5.96	6.65
May	6,470	466	1,400	3.85	4.44
June	1,260	224	511	1.40	1.56
July	1,490	210	458	1.26	1.45
August	838	154	271	.745	.86
September	3,950	176	857	2.35	2.62
October	4,900	514	1,510	4.15	4.78
November	4,600	557	1,290	3.54	3.95
December	8,770	478	3,820	10.50	12.11
1908.					
January	2,260	381	985	2.71	3.12
February, 27 days	3,110	364	915	2.51	2.52
March	10,900	805	2,080	5.71	6.58
April	8,690	950	3,520	9.67	10.79
May	8,610	598	2,710	7.45	8.59
June	3,420	209	621	1.71	1.91
July, 24 days	1,500	226	463	1.27	1.13
August	455	148	214	.588	.68
September	505	135	201	.552	.62
October	350	148	220	.604	.70
November	2,020	170	485	1.33	1.48
December	950	253	377	1.04	1.20

WEST CANADA CREEK[a] AT KAST BRIDGE, N. Y.

This station is located on the highway bridge about 4 miles above the outlet of West Canada Creek and about 3 miles above the village of Herkimer, N. Y. It was established May 15, 1905, for the purpose of obtaining general statistical and comparative data regarding the flow of West Canada Creek. Data on discharge are obtained by the current-meter method.

Records for 1907–8 have been furnished by the state engineer department.

About 20 miles above the gaging station is the dam of the Utica Gas and Electric Company, which develops power for transmission to Utica and other places in this vicinity. Water is diverted from West Canada Creek near the village of Hinkley, for domestic and commercial uses at Utica, by the Consolidated Water Company of Utica, N. Y.

No important tributaries enter the creek between this station and that at Twin Rock Bridge. Conditions for determining accurate discharge are fair and a fairly good rating table has been developed.

Information in regard to this station is contained in the annual reports of the state engineer and surveyor, State of New York.

[a] For description of this creek see general description of Mohawk River, p. 211.

Daily discharge, in second-feet, of West Canada Creek at East Bridge, N. Y., for 1907–8.

Day.	Jan.	Feb.[a]	Mar.[a]	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4,875	.....	.....	6,025	7,130	804	942	446	234	1,805	1,095	752
2	4,585	.....	.....	3,560	5,528	767	1,248	658	200	968	1,095	840
3	3,678	.....	.....	2,786	3,324	745	1,770	942	271	(b)	1,910	797
4	18,680	.....	.....	2,326	2,694	694	1,525	826	840	(b)	4,440	541
5	9,055	.....	.....	2,418	2,878	599	651	570	2,096	(b)	2,786	351
6	5,238	.....	.....	3,029	2,372	1,840	511	475	1,197	(b)	2,050	599
7	4,150	.....	.....	2,464	2,326	2,970	446	456	826	(b)	8,275	658
8	4,585	.....	.....	1,630	2,015	1,980	370	461	672	6,790	9,152	621
9	3,619	.....	.....	1,735	1,980	942	414	442	584	8,275	4,222	708
10	2,015	.....	.....	1,274	1,700	723	356	423	708	4,032	2,464	8,080
11	2,015	.....	.....	1,420	1,770	767	290	347	3,088	2,188	1,700	9,720
12	1,455	.....	.....	1,875	1,490	942	504	267	5,310	3,088	1,420	4,512
13	1,197	.....	.....	2,015	1,350	687	526	394	3,265	2,418	1,222	2,372
14	1,197	.....	.....	1,525	1,299	541	526	916	1,490	1,980	993	2,188
15	1,120	.....	.....	1,274	1,324	577	461	428	818	1,420	866	1,525
16	a 636	.....	.....	1,095	1,095	1,044	390	285	1,299	1,324	(b)	1,490
17	a 475	.....	.....	993	1,070	526	475	342	694	993	(b)	1,274
18	a 584	.....	.....	1,018	1,070	437	526	238	584	942	(b)	1,172
19	a 562	.....	.....	891	1,172	433	584	118	562	833	(b)	1,044
20	(a)	.....	.....	840	942	390	451	356	511	866	(b)	840
21	a 1,805	.....	.....	767	866	423	433	333	680	826	(b)	891
22	1,350	.....	.....	730	1,172	366	375	299	687	745	1,120	826
23	a 782	.....	.....	782	716	366	428	271	591	680	968	2,146
24	a 723	.....	.....	3,619	804	309	840	356	774	651	811	6,450
25	a 665	.....	.....	4,875	804	390	767	328	993	584	993	5,770
26	(a)	.....	.....	8,275	993	414	621	708	1,095	456	866	3,796
27	(b)	.....	.....	7,788	1,350	414	782	262	1,018	461	826	2,326
28	.....	.....	.....	5,310	1,274	446	584	299	833	4,802	866	3,737
29	.....	.....	.....	4,948	1,248	428	428	276	993	4,875	1,146	3,206
30	.....	.....	.....	4,948	993	555	428	248	1,980	2,326	993	2,234
31	.....	.....	.....	.....	840	.....	366	262	.....	1,490	.....	4,368
1908.												
1	.....	.....	628	5,020	9,368	2,878	361	314	304	470	418	818
2	.....	.....	866	3,973	8,665	1,595	299	238	280	456	351	811
3	.....	.....	1,385	2,510	5,770	1,455	295	262	276	319	361	687
4	.....	.....	1,222	1,770	4,091	1,248	271	366	248	338	285	548
5	.....	.....	1,044	1,525	3,029	993	446	328	252	323	295	636
6	.....	.....	760	4,150	3,147	804	394	518	230	314	285	428
7	.....	.....	891	3,383	4,150	701	328	723	257	319	328	584
8	.....	.....	811	6,110	5,528	643	636	475	338	262	461	1,172
9	.....	.....	833	8,080	4,875	774	942	470	314	234	366	1,385
10	.....	.....	752	6,025	3,737	621	643	442	290	280	437	908
11	.....	.....	643	5,455	2,602	526	451	351	243	437	465	767
12	.....	.....	1,146	5,020	2,326	475	356	323	309	665	1,189	942
13	.....	.....	1,560	4,295	2,015	451	390	347	323	551	1,070	1,235
14	.....	.....	2,602	2,786	2,694	423	276	351	188	437	760	1,172
15	.....	.....	3,560	4,032	2,924	456	267	314	238	428	651	942
16	.....	.....	4,440	4,150	2,050	570	356	314	295	333	555	1,044
17	.....	.....	3,501	3,206	2,602	599	366	562	179	361	465	942
18	.....	.....	2,740	2,878	1,350	465	1,665	891	271	347	526	672
19	.....	.....	2,326	4,512	1,385	968	3,501	672	252	176	465	737
20	.....	.....	1,840	4,295	1,324	745	1,735	497	262	262	577	672
21	.....	.....	1,490	2,970	993	1,044	993	394	194	248	752	687
22	.....	.....	1,560	2,510	1,197	651	1,805	385	185	276	716	628
23	.....	.....	1,980	2,188	2,050	511	916	351	208	230	767	489
24	.....	.....	3,560	4,875	1,945	451	730	238	176	295	826	518
25	.....	.....	2,924	8,470	1,222	548	606	328	170	319	1,197	651
26	.....	.....	3,088	8,470	1,910	442	789	314	185	156	2,096	651
27	.....	.....	5,165	9,955	2,648	461	636	290	204	370	2,157	628
28	.....	.....	7,592	10,190	1,665	385	548	295	133	356	1,788	577
29	.....	.....	11,130	8,762	1,197	395	428	276	591	577	1,103	541
30	.....	.....	6,960	4,585	1,274	370	390	309	730	694	908	489
31	.....	.....	5,020	.....	1,770	.....	314	211	.....	548	.....	651

[a] Ice obstruction. [b] No record.

NOTE.—Ice obstruction during portions of January and February, 1908.

Monthly discharge of West Canada Creek at East Bridge, N. Y., for 1907–8.

[Drainage area, 574 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Square miles.	
1907.					
January (24 days) [a]	18,700	[a] 475	3,130	5.45	4.86
April	8,280	730	2,740	4.77	5.32
May	7,130	716	1,790	3.12	3.60
June	2,970	309	751	1.31	1.46
July	1,770	290	613	1.07	1.23
August	942	118	420	.732	.84
September	5,310	200	1,160	2.02	2.25
October (26 days)	8,280	456	2,150	3.75	3.63
November (24 days)	9,150	811	2,180	3.80	3.39
December	9,720	351	2,450	4.27	4.92
1908.					
March	11,100	628	2,710	4.72	5.44
April	10,200	1,520	4,870	8.48	9.46
May	9,370	993	2,950	5.14	5.93
June	2,880	370	755	1.32	1.47
July	3,500	267	714	1.24	1.43
August	891	211	392	.683	.79
September	730	133	271	.472	.53
October	694	156	367	.639	.74
November	2,160	285	754	1.31	1.46
December	1,380	428	762	1.33	1.53

[a] 8 days' ice obstruction.

EAST CANADA CREEK [a] AT DOLGEVILLE, N. Y.

This station was established September 23, 1898, for the purpose of obtaining general statistical and comparative data regarding the flow of East Canada Creek. It is located at the dam of the Herkimer County Light and Power Company, about 7 miles above the outlet of the stream at High Falls, near the village of Dolgeville, N. Y.

The record is kept of the flow over the dam and through the wheels. The discharge over the dam is computed from a discharge curve based on United States Geological Survey experiments at Cornell University. The discharge through the wheels is computed from current-meter measurements in the tailrace. Records for 1907–8 have been furnished by the state engineer department.

Spruce Creek, the principal tributary to East Canada Creek, enters about 1 mile above Dolgeville. Water is diverted from this creek and from Beaver Brook, one of its tributaries, at Diamond Hill, for use at Little Falls, N. Y. Water is also diverted from Cold Brook, a tributary to East Canada Creek, for use at Dolgeville, N. Y. No allowance is made for these diversions in computing the discharge at the gaging station.

Information in regard to this station is contained in the annual reports of the state engineer and surveyor, State of New York.

[a] For description of this creek see general description of Mohawk River basin, p. 211.

Daily discharge, in second-feet, of East Canada Creek at Dolgeville, N. Y., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1,752	689	186	940	884	181	116	172	[a] 105	602	351	[a] 261
2	2,224	624	145	527	504	[a] 129	231	231	100	382	271	370
3	1,452	[a] 771	[a] 170	346	358	218	347	145	141	324	[a] 631	330
4	3,866	323	152	312	255	114	250	[a] 161	246	1,082	878	270
5	3,088	359	148	462	[a] 162	218	133	189	249	517	1,007	271
6	[a] 2,757	516	141	640	270	902	117	214	250	[a] 425	850	266
7	2,413	525	218	[a] 167	264	902	[a] 100	191	242	462	3,147	269
8	2,079	546	192	260	265	645	100	199	[a] 109	1,138	2,422	[a] 337
9	1,518	420	169	268	250	[a] 654	106	187	246	1,747	1,152	342
10	1,136	[a] 670	[a] 92	227	259	696	98	104	246	1,247	[a] 821	452
11	1,008	441	185	254	126	205	137	[a] 223	254	1,271	709	2,050
12	783	252	183	262	[a] 126	200	134	138	250	1,070	805	1,749
13	[a] 1,113	226	149	208	137	200	203	167	247	[a] 1,052	700	1,403
14	598	215	248	[a] 181	237	210	[a] 141	157	237	1,007	503	1,029
15	368	373	303	250	226	204	147	127	[a] 117	456	471	[a] 677
16	264	189	377	254	238	[a] 91	166	117	242	304	523	872
17	448	[a] 260	[a] 341	242	235	222	180	105	253	304	[a] 404	561
18	649	216	258	246	192	220	241	[a] 100	246	274	358	429
19	910	197	251	235	[a] 95	164	218	96	238	227	321	452
20	[a] 767	210	286	204	235	169	158	106	242	[a] 159	278	609
21	504	209	247	[a] 102	221	132	[a] 112	106	279	283	305	443
22	390	179	322	235	227	112	126	124	[a] 168	256	353	[a] 283
23	615	179	792	203	216	[a] 107	180	105	269	172	246	1,583
24	368	[a] 232	[a] 902	1,549	216	120	187	100	276	257	[a] 356	2,235
25	295	194	621	1,391	185	146	249	[a] 85	344	252	333	1,626
26	245	207	460	1,418	[a] 100	226	196	95	288	221	334	1,220
27	[a] 237	188	838	2,337	253	235	189	105	300	[a] 108	278	1,117
28	449	199	2,147	[a] 1,005	249	178	[a] 63	131	299	757	403	1,125
29	382	.....	2,742	631	233	184	84	105	[a] 328	1,292	380	[a] 814
30	413	.....	2,892	470	167	[a] 96	113	100	266	792	327	954
31	604	.....	[a] 2,018	.....	236	.....	121	105	.....	442	.....	924
1908.												
1	837	290	[a] 417	1,793	3,878	1,030	190	105	105	141	[a] 153	237
2	806	[a] 287	534	1,650	2,701	850	127	[a] 117	109	141	125	144
3	445	329	782	1,420	[a] 2,206	765	85	105	105	139	121	169
4	[b] 150	278	589	840	1,583	730	91	121	100	[a] 100	145	167
5	[a] 756	298	491	[a] 842	1,433	431	[a] 195	121	112	95	128	170
6	338	287	457	1,092	1,132	236	121	505	[a] 32	114	125	[a] 130
7	619	299	533	1,559	1,542	[a] 392	121	282	141	105	146	315
8	480	282	[a] 465	2,361	2,569	239	197	187	129	105	[a] 242	833
9	315	[a] 172	314	4,302	1,865	209	126	[a] 121	105	121	177	768
10	343	209	350	4,097	[a] 1,221	264	121	121	109	121	168	694
11	868	239	472	2,804	1,157	190	121	121	113	[a] 109	243	544
12	[a] 620	170	514	[a] 2,472	1,108	209	[a] 121	132	101	138	544	369
13	397	170	705	2,068	745	170	121	121	[a] 100	132	304	[a] 457
14	378	232	1,081	1,673	1,001	[a] 190	121	121	109	209	315	348
15	353	851	[a] 920	1,903	1,133	303	130	113	109	122	[a] 95	349
16	306	[a] 3,414	1,244	2,677	970	594	132	[a] 105	109	117	95	437
17	326	2,650	1,087	2,024	[a] 841	404	121	461	117	121	252	316
18	373	1,708	988	2,097	788	243	945	495	117	[a] 109	.....	264
19	[a] 369	1,659	850	[a] 2,153	809	190	[a] 870	318	95	100	.....	301
20	323	1,290	867	1,957	656	209	731	269	[a] 80	105	278	[a] 188
21	319	1,090	710	1,633	602	[a] 172	567	156	80	109	309	223
22	305	739	[a] 628	1,369	1,070	170	690	113	105	109	[a] 449	146
23	218	[a] 646	933	1,163	714	190	372	[a] 85	105	105	209	150
24	296	658	1,322	1,746	[a] 646	175	363	121	304	105	277	174
25	265	448	1,321	1,820	590	175	314	121	289	[a] 95	501	237
26	[a] 135	683	2,301	[a] 2,563	687	180	[a] 225	121	105	137	968	190
27	207	649	3,299	3,035	741	133	243	121	[a] 105	149	856	[a] 170
28	366	571	3,056	2,762	712	[a] 74	190	113	109	221	633	172
29	254	398	[a] 2,636	2,335	679	115	216	105	365	338	[a] 517	170
30	294	.....	2,457	1,945	905	156	113	[a] 105	48	257	263	170
31	379	.....	2,295	.....	[a] 813	.....	109	95	.....	200	.....	190

[a] Sunday.

[b] Pond empty, January 4, 1908.

Monthly discharge of East Canada Creek at Dolgeville, N. Y., for 1907–8.

[Drainage area, 256 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Square miles.	
1907.					
January	3,870	237	1,090	4.26	4.91
February	771	179	343	1.34	1.40
March	2,890	92	586	2.29	2.64
April	2,340	102	528	2.06	2.30
May	884	95	246	.961	1.11
June	902	91	269	1.05	1.17
July	347	63	159	.621	.72
August	231	85	138	.539	.62
September	344	100	236	.922	1.03
October	1,750	108	609	2.38	2.74
November	3,150	246	664	2.59	2.89
December	2,240	261	817	3.19	3.68
The year	3,870	63	474	1.85	25.21
1908.					
January	868	135	401	1.57	1.81
February	3,410	170	724	2.83	3.05
March	3,300	314	1,120	4.38	5.05
April	4,300	840	2,070	8.09	9.03
May	3,880	590	1,210	4.73	5.45
June	1,030	74	313	1.22	1.36
July	945	85	264	1.03	1.19
August	505	85	171	.668	.77
September	365	32	124	.484	.54
October	338	95	138	.539	.62
November	968	95	306	1.20	1.34
December	833	130	297	1.16	1.34
The year	4,300	32	595	2.33	31.55

NOTE.—Discharge interpolated November 18 and 19, 1908.

SCHOHARIE CREEK[a] AT PRATTSVILLE, N. Y.

This gaging station was established November 7, 1902, by the United States Geological Survey on the highway bridge. On May 7, 1907, it was assumed by the board of water supply of the city of New York, by whom this description and the following tables of discharge were supplied for the complete years 1907 and 1908. On May 7, 1907, a new standard board of water-supply chain gage was established in place of the old one, which was dilapidated and unwieldy. The old datum was preserved and the present readings conform to those already obtained.

The bridge is a single-span steel highway bridge 187.8 feet between abutments, and all the water passes between them at all but the very highest stages.

In high water measurements are made from the bridge, while in low-water stages they may be made by wading at a point about 500 feet below the bridge.

The gage is attached to the floor of the bridge on the upstream side near the left bank. The chain length is 27.05 feet. The elevation of the datum of the gage is 1,130.03 feet (U. S. G. S. bench mark). The gage datum is referred to a bench mark—a circle of white paint

[a] For description of this creek see general description of Mohawk River basin, p. 211.

marked on a bowlder at the right end of the downstream side of the bridge; elevation 1,151 feet, or 20.97 feet above the datum of the gage.

Gage readings are made each morning and evening by Miss Edna M. Snyder, of Prattsville, N. Y.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York. The monthly discharge for 1907 as published in this report is superseded by the values computed by the New York board of water supply as given below, on the basis of additional data obtained since May 7, 1907.

Daily gage height, in feet, of Schoharie Creek, Prattsville, N. Y., for 1907.

[Edna M. Snyder, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan	Feb.	Mar.	Apr.
1	6.1	6.55	5.5	5.5	11	5.3	6.2	5.5	5.0	21	6.3	5.9	4.8	5.1
2	5.5	6.6	5.5	5.4	12	5.2	6.15	5.5	5.15	22	6.5	5.8	5.3	5.2
3	5.3	6.5	5.9	5.25	13	5.1	6.15	5.9	5.25	23	7.0	5.8	6.1	5.45
4	6.0	6.35	5.9	5.2	14	5.2	6.1	8.0	5.3	24	7.1	5.8	6.1	7.2
5	5.5	6.3	5.9	5.15	15	5.4	6.1	7.0	5.3	25	7.0	5.9	5.8	6.3
6	5.3	6.3	5.9	5.05	16	5.3	6.1	5.5	5.25	26	7.0	5.9	5.5	6.3
7	5.4	6.3	5.9	4.95	17	5.3	6.1	5.5	5.25	27	7.0	5.8	5.05	6.0
8	5.85	6.3	5.9	5.0	18	6.3	6.05	5.4	5.2	28	6.9	5.7	6.55	5.7
9	5.7	6.2	5.8	5.0	19	6.45	6.05	5.2	5.2	29	6.8	.....	6.4	5.6
10	5.4	6.2	5.7	5.0	20	6.35	6.0	5.2	5.15	30	6.7	.....	6.2	5.5
										31	6.6	.....	5.8	.....

NOTE.—River open January 1–11; ice conditions, January 12 to March 13, and open March 14. During the frozen period gage heights were taken to water surface in a hole in the ice.

Daily discharge, in second-feet, of Schoharie Creek at Prattsville, N. Y., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	1,130	250	100	620	620	230	190	45	15	550	840	280
2	620	270	105	550	620	350	120	45	25	375	690	230
3	490	260	110	460	620	1,480	120	45	45	300	6,525	230
4	1,030	200	105	430	620	1,080	90	45	55	1,080	1,975	230
5	620	240	100	400	1,030	760	80	32	430	840	1,240	350
6	490	200	95	350	800	930	80	32	170	550	1,360	325
7	550	170	90	300	620	690	120	45	90	430	13,100	230
8	885	160	95	325	930	550	105	32	80	885	3,070	230
9	760	160	100	325	690	490	90	25	90	760	1,840	210
10	550	160	95	325	620	430	80	25	155	550	1,240	10,100
11	490	150	90	325	550	375	90	25	230	430	930	3,900
12	430	140	100	400	490	325	280	25	885	550	725	1,720
13	375	130	100	460	430	280	190	15	350	430	620	1,025
14	320	140	3,900	490	375	255	140	25	230	375	550	840
15	300	150	2,240	490	325	230	105	15	170	325	430	760
16	260	140	620	460	430	230	90	8	140	280	400	690
17	240	130	620	460	760	199	120	15	120	255	350	550
18	300	120	550	430	550	155	190	15	90	230	325	550
19	370	130	430	430	550	155	190	25	80	230	350	490
20	800	130	430	400	490	190	140	15	65	230	325	460
21	600	130	230	375	430	155	170	8	105	230	325	430
22	400	140	490	430	375	140	140	8	120	230	325	430
23	350	150	1,130	585	325	120	120	15	155	190	280	2,520
24	300	150	1,130	2,520	300	105	105	8	690	155	280	3,415
25	350	150	840	1,360	280	105	80	15	375	155	300	1,480
26	440	120	620	1,360	325	90	65	25	255	170	300	1,080
27	400	110	350	1,030	400	120	65	8	230	170	325	840
28	360	100	1,660	760	400	90	45	8	190	6,040	325	1,240
29	330	.....	1,480	690	325	90	45	15	980	4,440	350	1,240
30	280	.....	1,240	620	280	155	45	15	1,030	1,975	300	930
31	220	.....	840	.....	255	.....	45	15	.....	690	.....	1,360

[a] Discharge estimated January 14 to March 13, and May 1 to 6, 1907.

Daily discharge, in second-feet, of Schoharie Creek at Prattsville, N. Y., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.[a]												
1	540	280	470	965	3,740	590	45	27	16	54	268	60
2	620	260	710	870	1,625	410	80	27	8	60	235	49
3	530	240	725	710	1,120	330	124	27	16	48	216	46
4	420	220	500	540	870	265	153	35	11	43	156	66
5	410	180	410	440	690	255	355	40	13	39	138	85
6	600	144	265	530	560	215	165	40	13	39	119	66
7	580	180	795	530	655	185	71	35	17	38	165	300
8	560	200	295	705	2,590	135	71	35	11	38	99	350
9	540	220	210	1,800	1,300	140	52	31	8	29	85	280
10	520	250	235	1,070	990	155	37	35	9	19	106	260
11	500	270	300	950	760	165	52	31	11	39	99	350
12	480	290	620	795	625	125	27	35	16	39	85	434
13	460	300	930	725	560	105	31	42	8	39	72	242
14	440	313	1,900	580	620	80	27	40	8	40	60	320
15	420	8,000	1,710	590	560	90	27	40	7	39	66	205
16	390	3,380	1,300	690	475	185	24	31	7	35	72	280
17	390	1,340	670	600	400	155	31	40	7	29	78	205
18	390	780	560	530	365	125	24	40	7	29	72	172
19	385	600	795	690	330	90	24	35	7	39	66	172
20	385	454	620	655	330	80	24	31	7	39	66	165
21	380	470	500	600	330	65	24	31	7	31	92	165
22	380	410	440	500	3,090	65	28	29	7	27	72	148
23	370	410	540	465	2,150	70	27	31	7	19	66	172
24	360	420	1,200	560	1,050	40	24	29	7	29	66	172
25	350	450	885	600	780	40	184	25	7	29	66	205
26	340	460	1,340	670	600	50	220	31	8	72	60	234
27	330	478	2,040	580	520	45	113	33	8	765	66	150
28	320	600	3,410	1,220	400	30	89	31	15	410	60	150
29	310	530	3,210	760	330	35	89	31	148	784	60	145
30	300	.....	1,930	670	330	40	60	31	100	652	66	136
31	300	.....	1,240	.....	935	.....	37	31	.....	410	.....	242

[a] Discharge estimated January 7 to February 13, 1908, on account of ice conditions. December 7 to 31, 1908, lower gage in open water used.

Monthly discharge of Schoharie Creek at Prattsville, N. Y., for 1907–8.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	1,130	220	485	2.02	2.328
February	270	100	160	.67	.694
March	3,900	90	648	2.70	3.11
April	2,520	300	605	2.52	2.809
May	1,030	255	510	2.12	2.449
June	1,480	90	352	1.47	1.635
July	280	45	114	.48	.546
August	45	8	22	.09	.104
September	1,030	15	255	1.06	1.186
October	6,040	155	778	3.24	3.735
November	13,100	280	1,333	5.56	6.192
December	10,100	210	1,238	5.16	5.953
The year	13,100	8	542	2.26	30.741
1908.					
January	620	300	429	1.79	2.061
February	8,000	144	763	3.18	3.429
March	3,410	210	992	4.13	4.765
April	1,800	440	720	3.00	3.345
May	3,740	330	957	3.99	4.602
June	590	30	145	.60	.675
July	355	24	75	.31	.365
August	42	25	33	.14	.157
September	148	7	17	.07	.081
October	784	19	129	.54	.620
November	268	60	100	.42	.464
December	434	46	194	.81	.935
The year	8,000	7	380	1.58	21.499

KINDERHOOK CREEK AT ROSSMAN, N. Y.

Kinderhook Creek is an interstate stream, with total drainage area of 337 square miles, having its source in Hancock Mountains in western Massachusetts at an elevation reaching nearly to 1,500 feet above tide, and flowing southwesterly through Columbia and Rensselaer counties, N. Y., joining Claverack Creek, about 2 miles from the Hudson River, to form Stockport Creek, through which it discharges into the Hudson 4 miles north of the village of Hudson. Kinderhook Creek is an important stream for power, with considerable amounts unutilized, and affords also some opportunities for storage.

The gaging station, which was established March 17, 1906, to obtain general statistical data regarding the total flow of the creek, is located at the highway bridge near Rossman post-office, New York, about 7 miles northeast of Hudson.

The only important tributary above the station—Valatie Kill—enters at Valatie, about 7 miles distant.

About one-eighth mile above the station, at Chittenden Falls, are two mills, only one of which is at present in use. The river has also been developed at two points above Rossman—at Stuyvesant Falls and Kinderhook, distant respectively about 2 and 5 miles.

During the winter months the discharge is affected slightly for short periods by the presence of ice.

The datum of the chain gage has remained unchanged during the maintenance of the station. Conditions for obtaining accurate discharge are good, and a very good rating curve has been developed.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Kinderhook Creek at Rossman, N. Y., in 1906–1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1906.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 16[a]	Covert and Weeks	137	149	27.05	262
March 17	do	148	206	27.35	420
August 2	C. C. Covert	133	123	26.90	188
August 22[b]	do	130	195	26.67	124
October 28	E. F. Weeks	147	170	27.25	319
November 2	C. C. Covert	147	187	27.29	318
1907.					
March 16	E. F. Weeks	154	410	28.63	1,370
March 19	do	151	362	28.37	1,140
June 22	Wood and Hoyt	138	117	26.90	190
September 6	W. G. Hoyt	138	195	27.32	394
December 23	D. M. Wood	148	265	27.88	736
1908.					
February 27[c]	D. M. Wood	150	343	28.28	1,050
May 5	do	147	287	27.90	746
August 3[d]	G. M. Brett	139	169	26.78	141
August 31	C. R. Adams	142	60	26.50	72.5
September 8[e]	do	20	16.1	26.37	46.3
September 20[f]	D. M. Wood			25.94	4.5
December 31	do	110	60.2	26.54	76.6

[a] Slight ice conditions.
[b] Measurement made by wading 100 feet below the bridge.
[c] Some floating ice.
[d] Measurements made by wading 150 feet below the regular section.
[e] Measurement made in tail race by wading.
[f] Discharge estimated.

Daily gage height, in feet, of Kinderhook Creek at Rossman, N. Y., for 1907–8.

[Lester Allen, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	29.37	27.87	26.93	28.22	27.62	27.35	.....	26.58	26.27	28.27	29.45	27.57
2	29.50	27.87	26.83	27.93	27.62	27.70	.....	26.65	26.33	27.57	29.22	27.48
3	28.33	27.62	26.88	27.87	27.52	28.37	.....	26.57	26.30	27.60	30.72	27.42
4	27.97	27.53	26.88	27.78	27.50	28.72	.....	26.58	27.53	27.10	28.73	27.37
5	28.92	27.32	27.08	27.67	27.68	28.18	.....	26.58	27.73	27.30	28.57	27.28
6	28.82	27.15	27.12	27.62	27.62	28.43	.....	26.58	27.32	27.63	28.27	27.28
7	28.72	27.05	27.13	27.47	27.62	28.45	.....	26.58	26.97	27.83	31.47	27.28
8	28.73	27.25	27.12	27.45	27.63	28.27	.....	26.57	26.92	27.80	30.25	27.27
9	28.55	27.13	27.07	27.48	27.72	28.10	.....	26.60	26.88	28.37	29.75	27.18
10	28.03	27.13	26.98	27.48	27.60	27.78	26.58	26.60	26.90	27.92	29.23	28.98
11	28.27	27.28	26.98	27.63	27.52	27.72	26.68	26.58	27.40	28.02	28.48	29.85
12	28.08	27.38	26.88	27.92	27.48	27.62	26.70	26.52	27.38	28.60	28.47	28.93
13	27.92	27.48	26.93	28.13	27.43	27.50	27.38	26.47	27.42	28.92	28.30	28.70
14	27.82	27.28	27.28	28.37	27.37	27.45	26.85	26.43	27.32	27.97	28.10	28.48
15	27.62	27.23	28.65	28.50	27.33	27.37	26.85	26.42	27.07	27.85	28.05	28.27
16	27.53	27.15	28.55	28.23	27.50	27.17	26.85	26.33	26.95	27.73	27.90	28.17
17	27.57	27.27	28.30	28.20	28.85	27.08	26.87	26.37	26.87	27.70	27.87	27.90
18	27.52	27.30	28.23	28.03	28.33	26.97	27.25	26.38	26.88	27.58	27.82	27.88
19	27.62	27.28	28.32	27.95	28.13	26.88	27.17	26.37	26.83	27.48	27.82	27.83
20	27.42	27.17	28.07	27.95	28.05	26.83	27.12	26.32	26.77	27.38	27.78	27.80
21	28.00	27.12	27.70	27.87	27.83	26.90	27.23	26.35	26.72	27.68	27.72	27.73
22	27.83	27.12	27.77	27.77	27.67	26.90	27.02	26.28	26.73	27.53	27.68	27.72
23	27.58	26.97	28.10	27.58	27.53	26.88	26.92	26.27	26.82	27.43	27.62	27.85
24	27.72	26.87	28.73	27.70	27.38	26.85	26.77	26.25	28.68	27.33	27.52	28.68
25	27.90	26.83	28.25	28.15	27.32	26.88	26.75	26.27	27.83	27.18	27.48	29.00
26	27.88	26.98	28.18	27.93	27.43	26.90	26.77	26.25	27.47	26.98	27.48	28.30
27	27.97	27.12	28.13	27.78	27.60	26.85	26.73	26.27	27.42	27.03	27.53	28.30
28	28.02	27.18	28.35	27.80	27.52	26.87	26.73	26.27	27.33	29.17	27.52	28.32
29	28.08	.....	28.97	27.75	27.43	26.87	26.72	26.25	27.82	34.07	27.57	28.32
30	27.92	.....	28.85	27.70	27.32	26.92	26.68	26.25	27.65	32.00	27.60	28.32
31	27.87	.....	28.45	.....	27.33	.....	26.60	26.27	.....	30.05	.....	28.67
1908.[b]												
1	28.48	27.18	27.63	28.13	28.72	27.75	26.88	.....	26.42	26.30	26.52	26.53
2	28.42	27.20	27.52	28.12	28.35	27.47	26.75	26.67	26.48	26.47	26.56	26.53
3	28.32	27.08	27.40	28.03	28.05	27.08	26.77	26.73	26.55	26.38	26.58	26.48
4	28.25	26.97	27.22	27.93	27.93	27.22	26.70	26.75	26.50	26.42	26.43	26.57
5	27.95	26.92	27.12	27.87	27.88	27.02	26.72	26.73	26.48	26.32	26.48	26.43
6	27.83	26.93	27.07	27.77	27.82	26.97	26.62	26.85	26.18	26.32	26.60	26.55
7	27.78	27.00	27.18	27.67	27.82	27.02	26.77	26.72	26.37	26.55	26.43	26.53
8	27.67	27.07	27.32	27.83	28.77	26.92	26.68	26.75	26.33	26.43	26.50	26.55
9	27.57	27.07	27.33	28.35	28.82	26.83	26.72	26.60	26.35	26.50	26.55	26.79
10	27.45	26.95	27.23	28.28	27.90	26.92	26.68	26.72	26.42	26.42	26.48	26.68
11	27.48	26.92	27.42	28.15	28.72	26.83	26.67	26.62	26.50	26.21	26.50	26.70
12	27.55	26.90	27.93	28.05	28.33	26.88	26.67	26.68	26.33	26.41	26.52	26.60
13	29.30	26.95	30.28	27.92	28.07	26.83	26.65	26.68	26.38	26.43	26.50	26.52
14	28.87	27.10	29.70	27.82	28.13	26.82	26.63	26.68	26.40	26.45	26.48	26.58
15	28.37	31.55	28.87	28.30	28.27	26.92	26.67	26.70	26.47	26.50	26.60	26.59
16	28.25	31.83	28.87	28.13	28.08	28.03	26.65	26.57	26.43	26.37	26.53	26.62
17	28.07	28.33	28.17	28.07	28.00	28.02	26.58	26.52	26.40	26.43	26.24	26.58
18	27.92	27.75	27.97	27.98	27.85	27.88	26.53	26.53	26.35	26.33	26.53	26.65
19	27.87	27.52	27.90	28.28	27.68	27.70	26.88	26.70	26.33	26.38	26.52	26.48
20	27.72	27.32	27.90	28.25	27.62	27.32	26.62	26.82	26.12	26.43	26.50	26.47
21	27.62	27.13	27.92	28.25	27.60	26.93	26.87	26.73	26.40	26.40	26.52	26.53
22	27.50	27.18	28.13	28.12	27.40	26.80	26.80	26.68	26.40	26.46	26.54	26.60
23	27.45	27.13	29.27	27.97	27.38	26.85	.....	26.68	26.31	26.48	26.45	26.60
24	27.33	27.08	29.00	27.83	27.20	26.83	.....	26.65	26.32	26.42	26.52	26.58
25	27.28	27.17	28.70	27.63	27.07	26.92	.....	26.63	26.28	26.22	26.57	26.30
26	27.47	27.22	28.68	27.67	27.07	27.60	.....	26.67	26.27	26.48	26.58	26.62
27	27.47	28.25	28.70	27.82	26.95	27.32	27.60	26.63	26.20	26.42	26.53	26.52
28	27.48	28.03	28.73	27.93	26.95	26.98	27.52	26.68	26.33	26.50	26.53	26.43
29	27.32	27.77	28.68	27.97	26.95	26.98	27.30	26.57	26.52	26.63	26.58	26.53
30	27.18	.....	28.72	27.97	27.23	26.93	27.25	26.48	26.28	26.62	26.45	26.50
31	27.08	.....	28.67	.....	27.38	.....	26.95	26.48	.....	26.50	.....	26.53

[a] Conditions of flow probably affected by ice January 17 to 18 and January 22 to March 13, 1907.
[b] Discharge probably affected somewhat by ice conditions from about February 1 to 14 and December 9 to 24.

Rating table for Kinderhook Creek at Rossman, N. Y., for 1906–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
25.90	3	28.00	826	30.10	2,895	32.20	5,550
26.00	7	28.10	906	30.20	3,010	32.30	5,685
26.10	13	28.20	988	30.30	3,125	32.40	5,820
26.20	22	28.30	1,074	30.40	3,245	32.50	5,955
26.30	34	28.40	1,162	30.50	3,365	32.60	6,090
26.40	50	28.50	1,252	30.60	3,485	32.70	6,225
26.50	70	28.60	1,343	30.70	3,610	32.80	6,360
26.60	94	28.70	1,436	30.80	3,735	32.90	6,500
26.70	122	28.80	1,530	30.90	3,860	33.00	6,640
26.80	153	28.90	1,626	31.00	3,985	33.10	6,780
26.90	187	29.00	1,723	31.10	4,110	33.20	6,920
27.00	225	29.10	1,822	31.20	4,235	33.30	7,060
27.10	265	29.20	1,923	31.30	4,360	33.40	7,200
27.20	310	29.30	2,025	31.40	4,490	33.50	7,340
27.30	359	29.40	2,130	31.50	4,620	33.60	7,480
27.40	412	29.50	2,235	31.60	4,750	33.70	7,620
27.50	470	29.60	2,340	31.70	4,880	33.80	7,760
27.60	534	29.70	2,450	31.80	5,010	33.90	7,900
27.70	602	29.80	2,560	31.90	5,145	34.00	8,040
27.80	673	29.90	2,670	32.00	5,280	34.20	8,185
27.90	748	30.00	2,780	32.10	5,415		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 18 discharge measurements made during 1906, 1907, and 1908, and is well defined between gage heights 25.9 feet and 29 feet. Above rating differs slightly from that published in report of state engineer and surveyor, State of New York. A revision was made on the basis of new data more recently available.

Monthly discharge of Kinderhook Creek at Rossman, N. Y., for 1906–1908.

[Drainage area, 331 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1906.[a]						
March 16 to 31	2,790	229	761	2.30	1.37	A.
April	3,520	483	1,250	3.78	4.22	A.
May	1,570	153	534	1.61	1.86	A.
June	1,070	116	392	1.18	1.32	A.
July	568	70	222	.671	.77	A.
August	375	72	171	.517	.60	A.
September	153	58	102	.308	.34	A.
October	874	72	244	.737	.85	A.
November	1,150	147	433	1.31	1.46	A.
December	1,690	198	408	1.23	1.42	A.
1907.[b]						
January	2,240	.....	800	2.42	2.79	B.
February	.....	.....	175	.529	.55	D.
March	1,690	.....	694	2.10	2.42	A.
April	1,250	441	732	2.21	2.47	A.
May	1,580	370	570	1.72	1.98	A.
June	1,460	163	499	1.51	1.68	A.
July	.....	94	226	.683	.79	B.
August	108	28	58.1	.176	.20	A.
September	1,420	30	365	1.10	1.23	A.
October	8,140	217	1,140	3.44	3.97	A.
November	4,580	458	1,260	3.81	4.25	A.
December	2,620	301	932	2.82	3.25	A.
The year	8,140	28	621	1.88	25.58	

[a] Discharge probably not affected by ice conditions March and December, 1906.

[b] Discharge during the frozen periods, 1907, estimated on the basis of precipitation and temperature at Chatham, N. Y.:

	Sec.-ft.
Discharge, January 17 to 18, 1907	400
January 22 to 31, 1907	250
March 1 to 13, 1907	175

Discharge, July 1 to 9, estimated 322 second-feet on the basis of the discharge of Hoosic River at Buskirk, N. Y.

Monthly discharge of Kinderhook Creek at Rossman, N. Y., for 1906–1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.[a]						
January	2,020	257	723	2.18	2.51	A.
February	5,050	187	684	2.07	2.23	A.
March	3,100	253	1,040	3.14	3.62	A.
April	1,120	554	837	2.53	2.82	A.
May	1,550	206	736	2.22	2.56	A.
June	850	160	319	.964	1.08	A.
July	.....	77	212	.640	.74	A.
August	.....	66	115	.347	.40	A.
September	82	15	47.1	.142	.16	A.
October	102	23	56.7	.171	.20	A.
November	94	27	73.6	.222	.25	A.
December	100	.....	61.1	.185	.21	B.
The year	5,050	15	409	1.23	16.78	

[a] It is probable that the effect of ice conditions during February was not great; the values given above are on the basis of the open-channel rating. The discharge December 9 to 24 was estimated to be 50 second-feet on the basis of precipitation and temperature records at Chatham.

Discharge, July 23 to 26, estimated 475 second-feet, and August 1 estimated 170 second-feet on the basis of Hoosic River at Buskirk, N. Y.

NOTE.—Monthly discharge for 1906 and 1907 has been revised and differs slightly from that published in report of state engineer and surveyor, State of New York.

CATSKILL CREEK AT SOUTH CAIRO, N. Y.

The area drained by Catskill Creek lies on the north slope of the Catskills, mostly in the highlands of Greene County. The slopes are precipitous, and the basin contains no lakes or artificial storage of consequence. The stream flows for the most part over a rock bed and enters the Hudson River at Catskill. Its total drainage area is about 420 square miles. The waters of this creek will eventually form a part of the water supply for New York City. (See Esopus Creek.)

The gaging station was established July 4, 1901, at the highway bridge in the village of South Cairo. It was discontinued by the United States Geological Survey July 1, 1907. Data regarding discharge have also been obtained by the New York board of water supply, but are withheld for the present.

Measuring conditions at this station are poor, as the channel is shifting and the current sluggish at low stages.

Information in regard to this station is contained in the reports of the New York state engineer and surveyor.

Daily gage height, in feet, of Catskill Creek at South Cairo, N. Y., for 1907.

[Eugene Stewart, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	5.00	3.00	2.60	4.08	3.85	2.90	16	3.39	2.70	4.80	4.15	2.90	2.50
2	3.80	2.90	2.50	3.65	3.65	3.15	17	3.38	2.80	4.40	4.24	2.95	2.38
3	3.40	2.80	2.60	3.50	3.50	3.85	18	3.40	2.90	4.65	3.95	3.15	2.25
4	4.28	2.80	2.60	3.38	3.70	3.60	19	3.52	2.80	3.95	3.80	3.15	2.10
5	3.65	2.90	2.50	3.40	3.65	3.80	20	6.80	2.92	3.70	3.75	3.02	2.10
6	3.30	2.70	2.47	3.20	3.50	3.45	21	4.70	2.80	3.15	3.50	2.95	2.40
7	3.40	2.80	2.60	3.00	3.50	3.28	22	3.10	2.70	3.50	3.48	2.75	2.25
8	4.60	3.05	2.60	3.15	4.00	3.00	23	3.35	2.85	4.72	3.90	2.65	2.10
9	4.25	2.70	2.50	3.20	3.70	3.00	24	3.40	2.70	4.80	5.00	2.55	2.02
10	3.25	2.40	2.50	3.25	3.50	2.85	25	3.2	2.70	4.28	4.75	2.50	2.00
11	3.50	2.90	2.55	3.25	3.40	2.75	26	3.10	2.70	4.30	4.20	2.78	2.10
12	3.22	3.00	2.50	3.92	3.32	2.60	27	3.00	2.45	4.40	4.30	3.12	2.40
13	3.10	2.78	2.50	4.20	3.20	2.60	28	3.15	2.60	4.85	3.98	3.65	2.40
14	3.00	2.90	2.60	4.68	3.10	2.55	29	3.10	.....	5.10	3.85	3.28	2.40
15	3.40	2.50	5.00	4.45	3.00	2.50	30	3.05	.....	5.08	3.70	3.15	2.40
							31	3.00	.....	4.30	.....	2.95	.....

NOTE.—Ice conditions prevailed from about January 17 to March 14. During the frozen period gage heights were taken to water surface in a hole in the ice.

ESOPUS CREEK BASIN.

DESCRIPTION.

Esopus Creek has its source in northwestern Ulster County and enters Hudson River near Saugerties. The course of the upper portion of the stream is southeastward, but at Binnewater it turns abruptly to the northeast and for a distance of about 20 miles the course of the creek lies parallel to that of Hudson River, though the two streams flow in opposite directions. At Kingston the creek is 2.5 miles from the Hudson and at an elevation of 140 feet above tide.

The stream is characterized by a number of precipitous falls, which occur chiefly at points where it passes from one geologic formation to another. At Olivebridge it falls 28 feet, at Glen Erie 56 feet, and at Saugerties it makes its descent to the tide-water level of the Hudson in an abrupt fall of about 40 feet.

Esopus Creek is to be used as a source of water supply by New York City by placing a masonry dam 210 feet in maximum height near Browns Station, where the drainage area is 255 square miles. The Ashokan reservoir, so formed, will have a storage capacity of about 17 billion cubic feet and a present quantity of about 250 million gallons of water per day will be carried through the Catskill aqueduct to New York City, about 100 miles distant. Eventually portions of Rondout, Catskill, and Schoharie creeks are to be included in the supply, raising this to 500 million gallons daily.

ESOPUS CREEK NEAR OLIVEBRIDGE, N. Y.[a]

The weir is constructed of concrete, having a cross section similar to that of the experimental weir used in the hydraulic laboratory at Cornell University by the United States Geological Survey, in series 30, as described in Water-Supply Papers Nos. 150 and 200.

[a] This description and the tables of discharge 1906–1908 were furnished by the board of water supply of the city of New York.

The average height of this weir above the rock on which it is founded for its entire length is 7.54 feet; length between abutments, 193.90 feet. In order to form a channel of approach the abutments have been extended upstream at right angles with the axis of the weir for a distance of 16 feet, and the area of the channel of approach below the crest of the weir is 1,462 square feet. The abutments extend 14 feet above the level of the crest, and it is estimated that a flow of 40,000 cubic feet per second can be taken care of.

Measurements of the head on the weir are made in a well 24 inches in diameter, situated 53 feet upstream from the crest of the weir. Water is admitted to this well through a ¾-inch pipe extending 16 feet out into the stream in which, spaced 6 inches apart, are ⅛-inch holes bored vertically through the pipe. The center of this pipe is placed 18 inches above the bed of the stream. A continuous record of the head at this point is kept by means of a Friez automatic water-stage register, geared 1 to 1 and running twenty-four hours. Observations of the flow were first begun on October 17, 1906, though the automatic gage register was not installed until December 5. Prior to this latter date heads were read three times daily and reduced in the usual manner.

Computations of the discharge over this weir are made from a formula which has been deduced from the results of the experiments made by the United States Geological Survey and referred to above. During the winter the ice which forms between the wing walls which form the channel of approach is kept cut away, so that there may be no change in the conditions of flow due to this cause.

The watershed of Esopus Creek above the weir is 239 square miles, as measured on the topographic maps of the United States Geological Survey.

Daily discharge, in second-feet, of Esopus Creek near Olivebridge, N. Y., for 1906–1908.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1906.				1906.				1906.			
1	.....	178	271	11	.....	46	361	21	100	907	474
2	.....	153	253	12	.....	68	301	22	94	929	442
3	.....	138	246	13	.....	122	293	23	84	824	337
4	.....	122	302	14	.....	116	282	24	59	722	184
5	.....	108	271	15	.....	283	344	25	1,426	635	218
6	.....	92	428	16	.....	611	400	26	624	532	252
7	.....	81	510	17	.....	1,109	337	27	499	442	270
8	.....	70	204	18	.....	1,355	307	28	398	380	264
9	.....	53	285	19	[a] 25	1,170	220	29	292	326	260
10	.....	40	332	20	663	886	258	30	243	280	289
								31	212	.....	1,934

[a] Weir measurements begun October 19, 1906.

Daily discharge, in second-feet, of Esopus Creek near Olivebridge, N. Y., for 1906–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2,214	332	113	896	575	375	169	44	21	872	1,172	318
2	1,296	337	116	752	530	680	144	44	20	665	1,786	309
3	988	370	133	650	492	874	122	36	118	555	6,280	290
4	1,120	274	137	577	902	785	105	36	322	875	2,612	271
5	1,020	301	110	536	872	898	105	36	765	776	1,753	206
6	876	294	110	463	769	988	116	36	277	638	2,860	261
7	819	218	105	401	738	830	122	36	169	547	8,588	240
8	944	201	110	429	790	725	105	33	126	927	3,688	229
9	984	178	105	405	739	620	94	29	115	840	2,257	240
10	848	189	106	402	683	560	78	29	248	708	1,661	4,594
11	764	180	113	415	607	493	84	29	944	635	1,273	3,731
12	760	160	115	492	572	448	139	29	1,275	628	1,020	2,037
13	704	158	114	512	525	375	127	26	625	533	850	1,353
14	605	178	594	510	479	358	100	26	428	467	726	1,102
15	592	192	847	488	437	312	89	23	325	412	616	981
16	485	172	637	435	728	286	72	23	277	376	545	809
17	346	166	746	433	897	264	105	23	231	348	482	697
18	435	151	798	386	740	242	116	33	190	313	444	612
19	511	163	714	363	718	242	84	33	190	290	424	550
20	1,283	169	685	355	650	301	72	27	164	296	379	486
21	848	160	567	334	567	242	84	21	170	321	396	464
22	597	170	670	320	520	228	72	25	170	286	435	380
23	494	188	1,569	333	512	194	72	27	370	264	358	1,748
24	377	166	1,789	775	420	188	62	35	687	244	336	3,017
25	459	174	1,381	930	392	169	62	35	412	228	441	1,791
26	610	165	1,107	900	448	150	62	32	328	212	398	1,332
27	512	135	1,000	830	467	162	53	31	290	217	358	1,084
28	498	126	1,178	722	467	150	48	32	286	4,971	332	1,272
29	407	.....	1,468	653	392	139	48	28	1,778	3,976	362	1,313
30	359	.....	1,313	606	375	188	44	23	1,358	2,289	336	1,419
31	289	.....	1,078	.....	410	.....	36	20	.....	1,539	.....	1,469
1908.												
1	1,160	186	222	1,520	4,625	590	73	100	33	78	460	105
2	1,010	206	228	1,295	2,465	486	74	90	[a] 29	62	390	105
3	868	218	286	1,076	1,858	474	151	[a] 80	[a] 26	67	338	74
4	745	231	242	885	1,432	430	255	70	[a] 26	62	312	87
5	654	231	144	762	1,167	396	290	70	26	62	264	118
6	518	231	182	784	986	370	219	[a] 70	26	[a] 57	242	74
7	646	231	215	745	1,396	361	158	67	26	[a] 44	228	233
8	1,039	225	215	1,112	2,910	346	140	[a] 73	26	44	222	389
9	609	218	175	2,034	1,965	331	114	72	[a] 26	40	212	263
10	455	212	169	1,534	1,528	314	97	62	[a] 26	40	198	202
11	369	206	175	1,312	1,227	283	101	62	[a] 26	48	185	178
12	1,072	199	286	1,136	1,066	238	90	[a] 69	26	53	178	264
13	1,367	199	592	997	950	195	76	64	26	53	166	206
14	1,032	199	1,269	857	807	170	70	[a] 52	[a] 26	40	170	204
15	836	[b] 7,882	1,590	829	759	196	68	52	[a] 26	36	183	220
16	743	4,710	1,865	892	702	254	64	52	18	[a] 40	164	260
17	600	2,066	1,149	810	662	216	59	52	[a] 18	36	161	225
18	610	1,165	930	753	595	209	60	57	[a] 20	36	153	280
19	542	921	1,343	763	542	202	60	46	[a] 20	36	150	307
20	437	830	1,040	737	498	[a] 168	59	40	20	36	146	216
21	483	525	841	690	398	148	55	40	[a] 20	29	134	189
22	512	375	823	612	5,733	[a] 124	68	48	[a] 19	32	118	180
23	475	308	887	565	4,038	[a] 115	58	48	[a] 20	[a] 32	118	177
24	400	228	1,480	625	2,430	[a] 123	57	36	[a] 20	36	120	179
25	264	127	1,392	678	1,724	[a] 124	590	29	20	59	116	286
26	382	228	1,333	780	1,291	[a] 104	400	42	[a] 23	[a] 358	119	250
27	700	382	2,508	725	1,126	[a] 73	211	53	23	1,061	119	216
28	333	340	4,068	1,330	924	75	152	44	28	661	122	209
29	375	222	4,651	1,007	773	[a] 78	125	40	[a] 282	958	122	179
30	348	.....	3,019	978	784	[a] 77	114	33	[a] 135	706	116	159
31	333	.....	2,048	.....	1,621	.....	107	[a] 33	.....	567	.....	245

[a] Meter measurements at Olivebridge.
[b] Maximum flow over weir was 15,800 second-feet at 5.30 p. m.

NOTE.—Discharge during portions of 1907–8 were obtained by comparisons with Olivebridge and Bishops Falls gages, rating curves and meter measurements. Discharges for a period of ice conditions, February 1 to 4, 1908, obtained by proportion from the Kingston records.

Monthly discharge of Esopus Creek near Olivebridge, N. Y., for 1906–1908.

[Drainage area, 239 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1906.					
October 19 to 31	1426	25	363	1.52	0.73
November	1355	40	426	1.78	1.99
December	1934	184	359	1.50	1.73
1907.					
January	2,214	289	743	3.11	3.586
February	337	126	202	.85	.883
March	1,789	105	633	2.65	3.052
April	930	320	543	2.27	2.537
May	902	375	594	2.48	2.864
June	988	139	416	1.74	1.939
July	169	36	90	.38	.433
August	44	20	30	.13	.146
September	1,778	20	423	1.77	1.974
October	4,971	212	847	3.54	4.084
November	8,588	332	1,439	6.02	6.717
December	4,594	206	1,116	4.67	5.385
The year	8,588	20	590	2.47	33.600
1908.					
January	1,367	264	642	2.68	3.101
February	7,882	127	803	3.36	3.625
March	4,651	144	1,140	4.77	5.501
April	2,034	565	961	4.02	4.486
May	5,733	398	1,567	6.56	7.560
June	590	73	242	1.01	1.138
July	590	55	136	.57	.657
August	100	29	56	.23	.271
September	282	18	36	.15	.169
October	1,061	32	176	.74	.852
November	460	116	191	.80	.892
December	389	74	203	.85	.977
The year	7,882	18	528	2.21	29.229

NOTE.—The above values for 1906 are revisions of and supersede those published in Water Supply Paper 202.

ESOPUS CREEK AT KINGSTON, N. Y.

The Kingston gaging station was established July 5, 1901, by the United States Geological Survey, and was assumed on April 28, 1907, by the board of water supply of the city of New York, by whom this description and the following tables of discharge were supplied for complete years 1907 and 1908. A continuous record of gage heights has been kept by John Douglas, of Kingston, who reads the gage each night and morning.

The station is located on the upstream side of the steel highway bridge on Washington avenue, Kingston, N. Y. There is a clear span of 115 feet between the abutments, which are nearly vertical. In addition to the main channel there is an overflow channel 19 feet wide on the left bank, through which water flows at a gage height of about 12 feet. The station is valueless at the highest stages of the stream.

The station was originally equipped by the United States Geological Survey with the standard chain gage, located on the upstream

side of the bridge near the right abutment. This gage was dilapidated and so was replaced on June 19, 1908, by a board of water supply standard chain gage. The length of the chain is 31.04 feet from end of weight to marker.

Measurements are made from the bridge at high water and by wading or boat at lower stages. A sharp bend in the creek about 500 feet above the bridge causes considerable eddying and the current is uneven and irregular; at low water the velocities are more regular.

The bench mark is located on the coping stone at the upstream corner of the right abutment and has an elevation of 31.84 feet above the zero of the datum of the gage.

Information in regard to this station is contained in the report of the state engineer and surveyor, State of New York. The monthly discharge for 1907 as published in this report is superseded by the values computed by the New York board of water supply, as given below, on the basis of additional data obtained since April 28, 1907.

Discharge measurements of Esopus Creek at Kingston, N. Y., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height to top of ice.	Gage height to water surface.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Feet.*	*Sec.-ft.*
February 18	Covert and Wood	95	282	5.68	5.68	200
February 19	do	93	258	5.61	5.45	179

NOTE.—Measurements made under ice cover. Thickness of ice, 0.65 foot in each case.
The above two measurements were made by engineers of the United States Geological Survey.

Daily gage height, in feet, of Esopus Creek at Kingston, N. Y., for 1907.

[John Douglas, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Jan.	Feb.	Mar.	Apr.	May.
1	11.45	7.55	5.2	7.35	6.35	16	6.4	6.05	8.75	6.2	.....
2	9.15	7.95	5.2	7.0	6.2	17	7.15	5.8	8.45	6.15	.....
3	8.25	8.05	5.25	6.7	6.0	18	7.15	5.6	9.1	6.0	.....
4	8.35	7.15	5.4	6.45	6.8	19	7.25	5.6	8.15	5.75	.....
5	8.1	6.7	5.3	6.4	.....	20	8.45	5.5	7.9	5.8	.....
6	7.75	6.2	5.2	6.3	.....	21	11.3	5.45	7.5	5.65	.....
7	7.35	6.15	5.15	5.95	.....	22	10.1	5.25	8.1	5.6	.....
8	7.75	6.25	5.1	6.0	.....	23	9.65	5.1	8.8	5.6	.....
9	7.95	6.2	5.15	6.05	.....	24	8.9	5.1	9.6	6.5	.....
10	7.4	6.2	5.1	6.05	.....	25	9.0	5.1	8.85	7.45	.....
11	7.25	6.15	5.0	5.95	.....	26	8.95	5.4	8.2	7.2	.....
12	7.0	5.95	4.95	6.5	.....	27	8.6	5.5	7.8	7.1	.....
13	6.9	5.7	5.1	6.5	.....	28	8.45	5.4	7.85	6.75	.....
14	6.6	5.65	5.8	6.5	.....	29	8.3	.....	9.0	6.65	.....
15	6.85	6.10	9.2	6.4	.....	30	8.05	.....	8.75	6.4	.....
						31	7.65	.....	7.9	.....	.....

NOTE.—Ice conditions prevailed from about January 17 to about March 16. During the frozen period gage heights were taken to water surface in a hole in the ice.

Daily discharge, in second-feet, of Esopus Creek at Kingston, N. Y., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	3,850	450	150	1,200	735	545	260	60	30	1,580	1,990	490
2	2,280	460	160	1,150	670	580	200	70	25	1,125	1,610	520
3	1,715	500	180	895	605	955	140	70	43	1,135	9,050	440
4	1,780	370	190	775	940	1,050	140	65	130	1,100	4,330	430
5	1,640	410	150	740	1,190	1,065	120	50	1,465	1,200	2,875	510
6	1,425	400	150	700	1,020	1,520	135	75	785	910	2,475	390
7	1,200	300	140	580	1,070	1,150	235	60	400	775	10,250	430
8	1,425	270	150	670	1,120	1,050	180	55	500	1,125	6,580	380
9	1,550	240	140	690	940	945	140	50	210	1,350	3,600	380
10	1,230	260	140	690	895	785	115	50	260	1,050	2,530	390
11	1,150	240	150	580	840	680	120	50	490	940	1,990	3,850
12	1,025	220	160	795	730	615	135	35	2,270	920	1,540	5,850
13	980	210	160	805	675	545	185	60	1,135	830	1,240	3,140
14	850	240	800	795	645	500	130	43	690	720	1,000	2,030
15	955	260	1,150	750	600	445	115	35	520	795	860	1,900
16	750	230	860	670	965	375	135	35	430	535	760	2,920
17	470	220	1,010	670	1,425	375	120	33	365	495	680	2,140
18	590	200	1,080	670	1,150	326	270	43	300	445	640	950
19	690	220	970	510	1,065	365	185	28	355	415	610	710
20	1,740	230	930	525	930	370	135	44	230	395	580	1,330
21	1,150	220	770	480	795	326	115	39	220	510	640	1,360
22	810	230	910	455	740	370	105	37	205	405	830	1,330
23	670	250	2,070	460	690	230	120	34	310	400	540	870
24	510	220	2,580	795	640	235	95	34	1,340	340	550	1,520
25	620	240	2,080	1,275	560	225	78	43	790	315	680	3,110
26	830	220	1,680	1,125	535	200	78	30	605	310	680	2,650
27	690	180	1,465	1,200	690	200	85	52	500	285	680	2,010
28	680	170	1,485	915	660	185	78	37	445	4,375	570	1,590
29	550	.....	2,190	860	560	160	60	35	2,160	6,400	560	1,660
30	490	.....	2,020	750	520	190	75	33	2,400	4,040	540	1,910
31	390	.....	1,520	.....	455	.....	60	31	.....	2,600	.....	2,100
1908.[b]												
1	1,560	250	300	1,900	5,470	825	115	114	40	123	465	64
2	1,390	280	310	1,625	3,360	800	140	106	36	123	400	64
3	1,130	295	390	1,350	2,125	680	235	84	36	74	325	64
4	1,025	315	330	1,125	1,600	625	275	74	34	64	310	38
5	980	315	195	900	1,270	545	750	80	32	58	260	64
6	1,125	310	245	975	1,050	505	370	84	34	64	230	58
7	960	310	290	890	1,100	430	250	94	32	71	240	64
8	1,210	305	290	980	5,020	385	190	98	34	58	225	420
9	1,080	295	235	2,350	2,830	355	160	88	36	53	180	295
10	830	285	385	1,920	1,970	370	160	62	36	48	200	250
11	605	275	500	1,600	1,500	330	135	74	30	80	270	250
12	940	270	647	1,390	1,210	295	100	77	30	94	210	230
13	1,280	270	1,050	1,200	1,020	260	100	80	30	38	170	190
14	1,650	270	1,945	1,010	980	245	105	74	28	36	150	190
15	1,405	10,660	1,870	910	930	285	95	71	28	34	160	230
16	1,200	6,370	2,850	1,050	800	570	90	84	23	40	165	325
17	993	2,800	1,830	925	700	355	55	55	20	50	155	295
18	850	1,575	1,390	830	630	250	75	55	20	43	133	250
19	750	1,240	1,890	830	600	245	125	65	20	40	143	200
20	690	1,100	1,775	820	570	205	85	58	20	40	160	280
21	645	715	1,230	830	640	200	85	44	20	48	133	220
22	650	505	1,150	775	3,730	165	125	41	20	48	143	220
23	665	420	1,180	700	6,575	165	115	38	20	50	133	106
24	510	305	1,575	670	3,180	150	65	31	20	43	128	133
25	390	175	1,550	690	2,040	165	350	41	20	48	150	150
26	480	305	1,590	825	1,500	165	490	65	30	143	84	245
27	575	515	2,600	780	1,230	135	355	52	23	1,130	114	220
28	470	460	3,740	1,310	960	130	255	52	30	1,120	123	170
29	535	305	5,600	1,080	825	120	185	44	123	880	68	165
30	275	.....	3,620	926	770	120	180	38	170	760	77	175
31	250	.....	2,475	.....	1,180	.....	135	44	.....	578	.....	260

[a] Discharge January 17 to March 22, 1907, estimated by comparison with Esopus weir record.
[b] Discharge February 1 to 14, 1908, based on four discharge measurements and interpolations between them. Discharge November 26, 29, 30, and December 1 to 7 and 23 to 25, 1908, abnormal, due to storing of water at pulp-mill dam at Browns Station.

Monthly discharge of Esopus Creek at Kingston, N. Y., for 1907–8.

[Drainage area, 324 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	3,850	390	1,119	3.45	3.987
February	500	170	274	.85	.880
March	2,580	140	890	2.75	3.171
April	1,275	455	772	2.38	2.662
May	1,425	455	808	2.49	2.880
June	1,520	160	552	1.70	1.905
July	270	60	134	.41	.479
August	75	28	46	.14	.163
September	2,400	25	654	2.02	2.252
October	6,400	285	1,220	3.77	4.350
November	10,250	540	2,049	6.32	7.066
December	5,850	380	1,590	4.91	5.667
The year	10,250	25	842	2.60	35.462
1908.					
January	1,650	250	874	2.70	3.116
February	10,660	175	1,086	3.35	3.625
March	5,600	195	1,452	4.48	5.176
April	2,350	670	1,106	3.42	3.802
May	6,575	570	1,850	5.71	6.596
June	825	120	336	1.04	1.161
July	750	55	192	.59	.684
August	114	31	66	.20	.238
September	170	20	36	.11	.125
October	1,130	34	196	.61	.699
November	465	68	190	.59	.656
December	420	38	190	.59	.676
The year	10,660	20	631	1.95	26.554

RONDOUT CREEK AT ROSENDALE, N. Y.

The Rosendale gaging station is located on the highway bridge and was established by the United States Geological Survey on July 6, 1901. It was assumed by the board of water supply of the city of New York on June 1, 1907, at which time a new standard board of water supply chain gage was put in to replace the old one. This description and the following tables of discharge for the complete years 1907 and 1908 were furnished by the board of water supply of the city of New York.

Measurements are taken from the bridge at high and medium stages and by wading at a point about 1,000 feet below the bridge at low stages.

The gage is located on the downstream side of the bridge in the middle panel. The length of the chain from end of weight to marker is 34.53 feet.

The bench mark is a circular cut on rock on upstream corner, right abutment. The elevation is 33.56 feet above the datum.

The water is confined to one channel under the single span steel bridge, which is 135.7 feet between abutments at all stages.

A portion of the water of the creek is diverted by a dam below High Falls and sent through the Delaware and Hudson Canal, and is discharged into the creek below the gaging station. At Rock Locks, which is about 1½ miles below Rosendale, there is an overflow weir, from which the approximate discharge of the canal may be obtained. The weir, which has a crest of 3.8 feet, is located at the left end of the lock and is equipped with a standard board of water supply staff gage.

Information in regard to this station is contained in the report of the state engineer and surveyor, State of New York. The monthly discharge for 1907, as published in this report, is superseded by the values computed by the New York board of water supply, as given below, on the basis of additional data obtained since June 1, 1907.

Daily gage height, in feet, of Rondout Creek at Rosendale, N. Y., for 1907.

[Anna Huben, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Jan.	Feb.	Mar.	Apr.	May.
1	11.05	8.8	7.6	8.0	6.9	16	7.5	8.2	14.5	8.1	.....
2	9.3	8.7	7.6	7.7	6.85	17	7.4	8.2	13.9	7.2	.....
3	8.05	8.6	7.65	7.1	6.8	18	7.35	8.2	12.3	7.1	.....
4	8.0	8.65	7.6	7.1	6.9	19	7.75	8.1	10.1	7.05	.....
5	8.1	8.6	7.6	7.0	.....	20	9.1	7.9	9.65	7.0	.....
6	7.8	8.65	7.5	6.95	.....	21	9.6	7.85	9.3	6.9	.....
7	7.5	8.7	7.55	.....	.....	22	8.4	7.85	8.6	6.85	.....
8	8.0	8.6	7.5	.....	.....	23	7.8	7.8	10.15	6.9	.....
9	8.2	8.55	7.5	.....	.....	24	7.7	7.85	10.95	7.35	.....
10	7.8	8.45	7.7	.....	.....	25	7.85	7.8	9.7	7.9	.....
11	7.6	8.3	7.65	.....	.....	26	8.0	7.8	8.65	7.3	.....
12	7.7	8.2	7.7	.....	.....	27	8.4	7.75	8.35	7.25	.....
13	7.5	8.15	7.8	.....	.....	28	9.1	7.65	8.0	7.1	.....
14	7.3	8.15	7.9	7.3	.....	29	9.0	.....	10.1	7.0	.....
15	7.2	8.2	9.2	7.1	.....	30	8.9	.....	9.2	6.95	.....
						31	8.85	.....	8.9	.....	.....

NOTE.—Ice conditions prevailed from about January 17 to about March 17. During the frozen period gage heights were taken to water surface in a hole in the ice. Considerable quantities of anchor ice were lodged at the station during this period.

Daily discharge, in second-feet, of Rondout Creek at Rosendale, N. Y., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	5,300	1,270	440	2,000	500	417	328	72	20	1,091	1,474	680
2	2,990	1,190	440	1,460	467	997	279	79	20	767	1,266	610
3	1,520	1,120	470	1,150	428	1,507	216	81	20	593	7,028	530
4	1,460	1,160	440	625	497	767	147	69	115	626	3,215	530
5	1,570	1,120	440	610	718	937	136	68	1,637	1,166	1,998	565
6	1,250	1,160	380	550	1,640	1,317	167	65	567	793	1,757	500
7	960	1,200	410	510	799	937	388	73	331	612	12,609	520
8	1,460	1,120	380	480	847	747	187	68	233	717	5,367	490
9	1,670	1,080	380	625	848	657	142	77	186	767	3,111	430
10	1,250	1,000	500	550	797	582	97	73	184	654	2,251	3,180
11	1,050	900	470	700	677	537	157	68	367	678	1,791	4,250
12	1,150	830	500	960	643	487	227	65	1,797	716	1,315	2,200
13	960	790	560	960	527	457	142	63	565	543	1,015	1,425
14	780	790	630	780	500	417	93	63	394	455	1,015	1,240
15	700	830	1,590	643	468	377	87	63	288	396	846	1,340
16	960	830	3,840	1,588	526	317	102	69	253	386	815	1,170
17	870	830	7,240	718	2,558	287	142	66	253	367	720	890
18	830	830	6,950	643	1,477	292	332	73	241	353	660	820
19	1,200	760	4,050	598	1,218	317	228	71	210	313	660	720
20	2,725	630	3,450	568	848	347	167	63	236	262	650	750
21	3,390	600	2,990	498	698	332	143	63	215	386	680	800
22	1,900	600	2,120	468	590	317	117	63	163	391	890	770
23	1,250	560	4,110	498	567	262	103	61	345	396	750	950
24	1,150	600	5,170	848	510	262	98	141	2,073	375	750	3,780
25	1,300	560	3,520	1,358	440	237	95	87	798	375	950	2,300
26	690	560	2,180	798	508	252	120	66	528	341	1,010	1,570
27	970	530	1,840	768	678	242	118	37	415	423	860	1,275
28	1,510	470	1,460	643	768	193	85	31	348	2,637	775	1,250
29	1,420	.....	4,050	568	548	168	62	25	2,076	6,509	720	1,170
30	1,350	.....	2,850	528	468	274	70	20	2,041	3,667	670	1,550
31	1,310	.....	2,475	.....	429	.....	82	25	.....	2,318	.....	2,360
1908.[b]												
1	1,360	620	630	2,250	5,385	1,150	110	114	47	121	366	68
2	970	620	620	2,070	2,615	760	125	88	35	109	298	69
3	950	620	660	2,170	2,550	610	150	73	34	94	225	67
4	875	700	580	1,950	2,100	530	375	93	40	91	192	85
5	920	790	650	1,470	1,090	445	285	80	38	88	183	75
6	840	690	660	1,275	920	460	205	93	41	80	168	70
7	1,240	875	580	1,275	1,065	430	165	107	36	75	159	96
8	1,725	780	615	1,675	5,670	370	120	91	38	68	151	370
9	1,210	710	615	3,460	2,610	360	110	83	38	61	157	343
10	950	710	620	2,130	1,790	335	100	72	33	61	146	280
11	910	730	500	1,740	1,425	310	105	105	32	78	133	253
12	2,130	730	320	1,425	1,110	280	93	86	29	65	117	283
13	4,070	790	1,550	1,110	955	250	89	85	29	60	96	274
14	2,740	875	3,640	1,000	900	225	84	83	30	39	153	265
15	1,850	8,000	3,275	1,110	815	265	91	78	30	44	134	244
16	1,410	7,075	3,450	1,165	735	660	84	71	27	46	116	214
17	1,160	2,800	2,375	880	670	410	79	77	25	43	98	192
18	925	1,690	1,800	895	545	335	84	97	25	45	104	196
19	800	1,210	3,410	880	505	265	84	78	28	45	128	190
20	790	1,575	3,050	805	470	230	91	72	27	44	118	198
21	720	1,160	1,900	825	690	205	89	70	25	39	102	192
22	720	860	1,800	725	4,660	180	84	71	21	37	96	188
23	820	790	1,960	635	4,390	180	93	62	27	35	92	198
24	750	710	2,925	585	2,670	180	89	56	35	33	83	274
25	670	580	3,580	580	1,535	200	175	55	44	36	136	238
26	640	770	2,600	875	1,240	180	430	71	39	45	128	196
27	760	1,660	2,980	785	1,150	160	210	95	40	338	109	184
28	790	1,160	4,040	1,190	900	135	135	72	99	535	102	170
29	630	800	3,920	1,000	750	110	115	86	182	814	96	170
30	620	.....	3,760	920	800	130	112	62	143	657	85	152
31	690	.....	2,710	.....	1,910	.....	110	55	.....	459	.....	214

[a] Discharges include flow in Delaware and Hudson Canal, which was open from April 15 to November 16, 1907, and April 12 to December 12, 1908.

[b] Creek covered with ice February 2 to 15, 1908. February 15, 1908, discharge estimated.

Monthly discharge of Rondout Creek at Rosendale, N. Y., for 1907–8.

[Drainage area, 380 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	5,300	690	1,512	3.98	4.59
February	1,270	470	854	2.25	2.34
March	7,240	380	2,140	5.64	6.49
April	2,000	468	789	2.08	2.32
May	2,558	428	748	1.97	2.27
June	1,507	168	508	1.34	1.49
July	388	62	157	.41	.47
August	141	20	65	.17	.20
September	2,076	20	564	1.48	1.66
October	6,509	262	970	2.55	2.94
November	12,609	650	1,920	5.06	5.64
December	4,250	430	1,311	3.45	3.98
The year	12,609	20	962	2.53	34.37
1908.					
January	4,070	620	1,150	3.03	3.485
February	8,000	580	1,417	3.73	4.014
March	4.040	320	1,993	5.24	6.044
April	3,460	580	1,295	3.41	3.802
May	5,670	470	1,762	4.64	5.336
June	1,150	110	345	.91	1.013
July	430	79	138	.36	.418
August	114	55	80	.21	.243
September	182	21	44	.12	.129
October	814	33	141	.37	.426
November	366	83	142	.37	.418
December	370	67	194	.51	.589
The year	8,000	21	725	1.91	25.917

MISCELLANEOUS MEASUREMENTS IN HUDSON RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in Hudson River drainage basin during 1907 and 1908:

Miscellaneous measurements in Hudson River basin, 1907 and 1908.

Date.	Stream.	Locality.	Width.	Area of section.	Gage height.	Discharge.
1907.			*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 30	Hudson River	At Gooley, N. Y., 600 feet above mouth of Indian River.				69
February 15 [a]	do	Highway bridge at Corinth, N. Y.	349	1,190	125.96	2,580
February 16 [b]	do	2,000 feet above highway bridge at Corinth, N. Y.	613	3,640	125.95	1,740
October 1	North Creek	North Creek, N. Y.				54
October 24	do	do				11.3
November 12	do	do				53
November 16	do	do				30
August 28 [c]	Schroon River	Warrensburg, N. Y.				106
August 25 [d]	Sacandaga River	2 miles below Hope, N. Y.				62
August 25	West Branch Sacandaga River.	Just above entrance of West Branch into Sacondaga River near Wells, N. Y.				38
1908.						
January 22	North Creek	North Creek, N. Y.				30

[a] Measurement very approximate, account of poor measuring conditions.
[b] Measurement made under ice cover. Gage height to top of ice, 126.14 feet; thickness of ice, 1 foot. No ice at gage and river open for nearly the entire width 700 feet below the gage.
[c] Measurement made by wading just below electric railroad bridge. This point is ordinarily within backwater effect of the dam below, but the pond was not filled up on the date of this measurement.
[d] Measurement made by wading ½ mile above the mouth of West Stony Creek.

PASSAIC RIVER DRAINAGE BASIN.

DESCRIPTION.

Passaic River rises in Somerset and Morris counties, N. J. Above its confluence with Pompton River, its main tributary, it meanders through a flat country of Triassic red sandstone, to which in large measure must be attributed the turbidity of its waters. In contrast with the sluggish, muddy character of the Passaic, the Pompton is a rapid stream and its waters are clear. It drains parts of Sussex, Passaic, Morris, and other adjoining counties, and traverses for a large part of its course a country of hard crystalline rocks and heavy forests, the general level of which is several hundred feet above that of the Passaic. At their confluence the Pompton enters with a current which carries it well toward the right bank of the Passaic, and at times of flood causes much backwater in the latter.

The highest recorded flood which has occurred in this drainage basin was that of October, 1903. The flood began at 6.30 p. m. October 8, and lasted until midnight October 18, the maximum height, being reached at 9 p. m. October 10. There was a total rainfall of 11.74 inches between October 8 and 11. The estimated maximum discharge at the Dundee dam was 35,800 second-feet. This flood is fully described in Water-Supply Paper No. 92.

Gaging stations have been maintained in this basin as follows:

Passaic River at Millington (1903–1906).
Passaic River near Chatham (1903–1908).
Passaic River at Two Bridges (Mountain View) (1901–1903).
Rockaway River at Boonton (1903–4).
Pompton River at Pompton Plains (1903–4).
Pompton River at Two Bridges (Mountain View) (1901–1903).
Ramapo River near Mahwah (1903–1908).
Wanaque River at Wanaque (1903–1905).

PASSAIC RIVER NEAR CHATHAM, N. J.

This station was established February 10, 1903, and is maintained by the United States Weather Bureau. It is located at the second bridge about 1½ miles upstream from Chatham. No important tributaries enter in the immediate vicinity of the station. Canoe Brook enters from the east about 3 miles below the station.

This stream is important because many large cities draw their water supply from it and also because many cities on the lower portion throw their sewage into it. Records of discharge are also valuable in connection with power development and studies for the prevention of excessive floods in the basin.

The datum of the chain gage has remained the same since the establishment of the station. The discharge is affected by ice during

the winter months. Conditions of flow have changed somewhat during the period of maintenance of the station, but the rating curves developed for low and medium stages are considered good.

Discharge measurements of Passaic River near Chatham, N. J., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 12	Henshaw and Barrows	69	181	3.91	538
Do	do	69	184	3.90	527
September 2	R. H. Bolster	69	84	2.25	25.6

Daily gage height, in feet, of Passaic River near Chatham, N. J., for 1907–8.

[Miss M. A. Butler, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	5.0	.....	.....	2.8	3.1	2.4	2.5	2.1	2.2	4.1	3.8	3.3
2	4.8	.....	.....	2.7	2.9	2.5	2.4	2.1	2.2	3.8	3.6	3.1
3	4.6	.....	.....	2.7	2.8	3.2	2.4	2.1	2.2	3.4	4.0	2.9
4	4.5	.....	.....	2.6	3.4	3.0	2.3	2.2	2.2	3.2	3.8	2.8
5	4.4	.....	.....	2.6	3.3	2.9	2.3	2.2	2.4	2.9	3.6	2.7
6	4.0	.....	.....	2.5	3.3	3.0	2.2	2.1	2.6	2.7	3.4	2.5
7	3.7	.....	.....	2.5	3.2	2.8	2.2	2.1	2.5	2.5	5.2	2.4
8	3.5	.....	.....	3.0	3.1	2.7	2.2	2.1	2.5	3.2	5.0	2.4
9	3.5	.....	.....	3.6	3.0	2.6	2.2	2.1	2.4	3.6	4.7	2.3
10	3.3	.....	.....	4.0	3.0	2.5	2.2	2.1	2.4	3.3	4.4	2.7
11	3.1	.....	.....	3.7	3.8	2.5	2.2	2.1	2.4	3.1	4.2	3.5
12	2.9	.....	.....	3.4	3.6	2.4	2.6	2.1	2.6	3.0	3.9	3.3
13	3.8	.....	.....	3.6	3.4	2.4	2.5	2.1	2.5	2.9	3.6	3.2
14	4.8	.....	4.8	3.5	3.3	2.5	2.4	2.1	2.4	2.8	3.3	3.1
15	4.5	.....	6.0	3.2	3.1	2.5	2.3	2.1	2.3	2.7	3.1	3.7
16	4.0	.....	6.5	3.0	3.0	2.4	2.3	2.1	2.3	2.7	2.9	4.2
17	3.5	.....	7.0	2.8	4.3	2.4	2.3	2.1	2.2	2.6	2.7	3.9
18	4.2	.....	8.0	2.7	4.8	2.4	2.2	2.1	2.2	2.5	2.5	3.7
19	4.8	.....	7.0	2.6	4.5	2.3	2.2	2.1	2.4	2.4	3.4	3.4
20	5.0	.....	6.0	2.6	4.0	2.3	2.2	2.0	2.3	2.4	3.3	3.2
21	5.5	.....	5.5	2.5	3.5	2.3	2.4	2.0	2.3	2.3	3.2	3.0
22	5.0	.....	5.0	2.4	3.1	2.2	2.3	2.0	2.3	2.2	3.5	2.7
23	.....	.....	4.7	2.4	3.0	2.2	2.3	2.0	2.5	2.2	3.4	2.7
24	.....	.....	4.6	3.3	2.9	2.2	2.3	2.3	3.6	2.2	3.5	5.0
25	.....	.....	4.3	3.2	2.8	2.2	2.2	2.5	3.4	2.2	4.2	4.6
26	.....	.....	4.1	3.1	2.7	2.2	2.2	2.4	3.3	2.1	4.1	4.3
27	.....	.....	3.9	3.0	2.7	2.3	2.2	2.3	3.2	2.1	3.9	4.1
28	.....	.....	3.4	2.9	2.7	2.3	2.1	2.3	3.1	3.5	3.7	3.9
29	.....	.....	3.3	2.8	2.6	2.2	2.1	2.3	4.6	4.5	3.6	3.6
30	.....	.....	3.1	2.7	2.6	2.6	2.1	2.2	4.5	4.3	3.4	3.5
31	.....	.....	3.0	.....	2.5	.....	2.1	2.2	.....	4.0	.....	3.9
1908.[b]												
1	3.7	.....	4.7	2.9	3.4	3.4	2.3	2.4	2.5	2.5	3.0	2.1
2	3.4	.....	4.2	2.8	3.2	3.2	2.3	2.3	2.4	2.5	2.8	2.1
3	3.1	.....	3.8	2.8	3.1	3.1	2.3	2.2	2.3	2.4	2.6	2.1
4	3.5	.....	3.6	2.6	3.0	2.9	2.3	2.3	2.3	2.3	2.5	2.1
5	3.0	.....	3.3	2.7	2.9	2.8	2.3	2.3	2.3	2.3	2.3	2.1
6	.....	.....	3.1	2.6	2.7	2.7	2.4	2.2	2.4	2.2	2.3	2.1
7	.....	.....	3.4	2.7	2.8	2.7	2.3	2.4	2.6	2.2	2.2	3.5
8	4.3	.....	3.6	2.5	5.1	2.6	2.3	2.4	2.5	2.2	2.2	4.0
9	3.9	.....	4.0	3.2	5.3	2.5	2.3	2.2	2.4	2.2	2.2	3.8
10	3.6	.....	3.9	3.0	4.6	2.5	2.2	2.3	2.4	2.2	2.2	3.6
11	3.4	.....	3.7	3.1	4.4	2.4	2.3	2.2	2.3	2.3	2.2	3.3
12	4.0	.....	3.4	2.9	4.0	2.4	2.3	2.1	2.3	2.2	2.2	3.2
13	5.0	.....	3.2	2.9	3.8	2.3	2.2	2.2	2.3	2.2	2.1	3.1
14	.....	.....	3.0	2.7	3.3	2.3	2.2	2.2	2.3	2.2	2.1	3.1
15	.....	.....	2.9	2.7	3.5	2.3	2.2	2.1	2.2	2.2	2.4	3.0

[a] River frozen January 23 to March 13, 1907.

[b] River frozen January 6 to 7, January 25 to February 24, and December 23 to 31, 1908. River probably open January 14 to 24, 1908; no gage readings taken. December 7 to 22, 1908, may also have been affected by ice conditions.

Daily gage height, in feet, of Passaic River near Chatham, N. J., for 1907–8—Continued.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	.....	.....	3.7	2.6	3.9	2.8	2.3	2.2	2.2	2.2	2.3	2.9
17	.....	.....	3.5	2.6	3.6	3.2	2.3	2.2	2.2	2.2	2.3	2.8
18	.....	.....	3.3	2.5	3.3	3.0	2.3	2.1	2.2	2.2	2.2	2.8
19	.....	.....	4.2	2.6	3.1	2.8	2.2	2.2	2.2	2.1	2.2	2.9
20	.....	.....	4.1	2.5	2.9	2.6	2.1	2.2	2.2	2.1	2.3	2.8
21	.....	.....	3.7	2.5	3.3	2.5	2.2	2.0	2.2	2.1	2.3	2.7
22	.....	.....	3.5	2.4	3.8	2.5	2.6	2.1	2.2	2.1	2.2	2.6
23	.....	.....	3.4	2.5	3.8	2.4	2.4	2.5	2.2	2.1	2.2	.....
24	.....	.....	3.4	2.4	3.6	2.4	2.6	2.4	2.2	2.1	2.2	.....
25	.....	3.9	3.3	2.5	3.3	2.5	2.9	2.4	2.2	2.1	2.2	.....
26	.....	3.9	3.2	2.3	3.1	2.5	3.2	2.8	2.2	2.4	2.2	.....
27	.....	4.9	3.1	2.4	3.0	2.4	3.0	3.2	2.1	3.0	2.2	.....
28	.....	5.9	3.0	2.3	2.8	2.4	2.8	3.2	2.1	3.0	2.2	.....
29	.....	5.4	3.0	2.4	2.6	2.4	2.6	3.0	2.7	3.2	2.1	.....
30	.....	.....	3.0	2.3	2.5	2.3	2.4	2.7	2.6	3.5	2.1	.....
31	.....	.....	2.9	.....	3.5	.....	2.4	2.7	.....	3.2	.....	.....

Rating table for Passaic River near Chatham, N. J., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.00	8	3.20	235	4.40	775	6.20	1,780
2.10	12	3.30	271	4.50	825	6.40	1,900
2.20	20	3.40	310	4.60	875	6.60	2,020
2.30	31	3.50	350	4.70	925	6.80	2,140
2.40	45	3.60	390	4.80	980	7.00	2,260
2.50	60	3.70	435	4.90	1,035	7.20	2,380
2.60	77	3.80	480	5.00	1,090	7.40	2,500
2.70	97	3.90	525	5.20	1,200	7.60	2,620
2.80	119	4.00	575	5.40	1,310	7.80	2,740
2.90	144	4.10	625	5.60	1,420	8.00	2,860
3.00	172	4.20	675	5.80	1,540		
3.10	202	4.30	725	6.00	1,660		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 4 discharge measurements made during 1906–1908, one measurement made during 1909, and the form of the 1906 curve. It is well defined below gage height 4.0 feet. It is probable that this rating is also better adapted for conditions of flow during 1906 than the one used for that year in computing the monthly discharge as published in Water-Supply Paper No. 202.

Monthly discharge of Passaic River near Chatham, N. J., for 1907–8.

[Drainage area, 101 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	1,360	.....	577	5.71	6.58	C.
February	.....	.....	50	.495	.52	D.
March	2,860	.....	700	6.93	7.99	C.
April	575	45	179	1.77	1.98	A.
May	980	60	275	2.72	3.14	A.
June	235	20	64.6	.640	.71	A.
July	77	12	29.5	.292	.34	B.
August	60	8	17.6	.174	.20	B.
September	875	20	135	1.34	1.50	A.
October	825	12	210	2.08	2.40	A.
November	1,200	60	459	4.54	5.06	A.
December	1,090	31	331	3.28	3.78	A.
The year	2,860	8	252	2.50	34.20	
1908.						
January	1,090	.....	303	3.00	3.46	D.
February	1,600	.....	297	2.94	3.17	D.
March	925	144	360	3.56	4.10	A.
April	235	31	89.5	.886	.99	A.
May	1,260	60	368	3.64	4.20	A.
June	310	31	93.4	.925	1.03	A.
July	235	12	52.1	.516	.59	B.
August	235	8	52.3	.518	.60	B.
September	97	12	34.4	.341	.38	B.
October	350	12	57.8	.572	.66	B.
November	172	12	33.6	.333	.37	B.
December	575	12	133	1.32	1.52	D.
The year	1,600	8	156	1.55	21.07	

NOTE.—Discharge during the frozen periods and January 14 to 24, 1908, estimated, utilizing climatological reports and considering general run-off conditions in the vicinity of this station.:

	Second-feet.
Discharge January 23 to 31, 1907	289
March 1 to 13, 1907	75
January 6 to 7, 1908	125
January 14 to 31, 1908	225
February 1 to 24, 1908	150
December 23 to 31, 1908	40

The open channel rating was applied December 7 to 22, 1908. It is possible that results for this month may be excessive, due to ice conditions during this period.

RAMAPO RIVER NEAR MAHWAH, N. J.

This station, which is located at a concrete highway bridge about 1 mile west of Mahwah, N. J., was established February 10, 1903, by the United States Weather Bureau, which furnishes the gage readings. Measurements of discharge are made by the engineers of the United States Geological Survey.

Conditions for obtaining accurate discharge data are only fair. Records of discharge for 1907–8 will probably be published in the 1909 report.

The following discharge measurements were made during 1908:

Discharge measurements of Ramapo River near Mahwah, N. J., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 12	Henshaw and Barrows	63	285	4.74	581
September 3[a]	R. H. Bolster	38	32.6	2.39	23

[a] Measurement made at wading section.

RARITAN RIVER DRAINAGE BASIN.

DESCRIPTION.

Raritan River, the largest stream in New Jersey except the Delaware, is formed by two chief branches, North and South, which have their sources a few miles apart in the highlands of Morris County, flow southward, and unite near Somerville, from which point the course of the river is southeastward to Raritan Bay. The river is tidal to a point about 2 miles above New Brunswick, and is navigable to that city, about 12 miles from the mouth.

The total area of the drainage basin is 1,105 square miles, about 10 per cent of which is forested. The highlands consist mostly of trap rock and contain a large proportion of the wooded areas of the basin. The area outside of the highlands consists either of trap rock or red sandstone. Of the 800 square miles of drainage area above the gaging station at Boundbrook, about 150 square miles are in the cultivated part of the highlands and on the trap ridges; the remainder is mostly on the low, level, red sandstone plain.

The valley of the Raritan is populous and highly cultivated, and a large amount of water power is utilized on its various branches. North Branch is considered a valuable source for gravity supply, the elevation of the upper portion ranging from 750 to 1,100 feet. Millstone River, an important stream which unites with the Raritan a few miles west of Boundbrook, differs from the other branches, having its rise in sandhills and flowing northwestward through a sandy soil. It has large ground storage, and is better suited for power than for water supply, being very muddy at high stages.

The Raritan is paralleled on the south by the Delaware and Raritan Canal. (See Delaware River at Lambertville, N. J.)

Gaging stations have been maintained in the Raritan basin as follows:

Raritan River at Stanton (1903–1906).
Raritan River at Finderne (1903–1907).
Raritan River at Boundbrook (1903–1908).
North Branch Raritan River at Pluckemin (1903–1906).
Millstone River at Millstone (1903–1904).

RARITAN RIVER AT FINDERNE, N. J.

This station, which was established June 27, 1903, and discontinued March 31, 1907, was located at the highway bridge one-half mile from the station of the Central Railroad of New Jersey at Finderne. The locality is 7 miles below the junction of the North and South branches of the Raritan and 1½ miles above Millstone River, which enters from the south.

Data regarding discharge collected at this station are of value in determining the water power available at various sites along the river.

The datum of the chain gage was unchanged during the maintenance of the station. The discharge is affected by ice during the winter period. Conditions of flow remained practically constant throughout the period of maintenance, and a good rating curve has been developed.

Daily gage height, in feet, of Raritan River at Finderne, N. J., for 1907.

[Jacob Siegel, observer.]

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	8.85	4.60	4.38	16	5.18	4.85	8.42
2	5.48	4.28	4.50	17	4.62	4.78	8.35
3	5.15	4.42	6.12	18	4.38	4.58	8.50
4	5.82	4.48	5.98	19	4.80	4.65	6.62
5	5.40	6.70	5.30	20	5.62	4.90	8.72
6	4.82	6.78	5.02	21	4.98	5.20	6.18
7	4.78	6.68	4.65	22	5.25	4.70	5.85
8	4.68	6.22	4.62	23	4.88	4.52	5.75
9	4.82	5.68	4.15	24	5.65	4.38	5.22
10	4.78	5.38	4.70	25	5.65	4.42	5.18
11	4.32	5.15	4.35	26	5.25	4.25	4.88
12	4.50	4.82	4.35	27	5.05	4.45	4.72
13	5.78	5.20	4.18	28	5.22	4.32	4.58
14	6.75	4.80	8.22	29	4.72	.....	4.52
15	6.25	4.90	11.20	30	4.30	.....	4.48
				31	4.50	.....	5.40

NOTE.—Ice conditions prevailed from about January 24 to March 13.

Rating table for Raritan River at Finderne, N. J., for 1905–1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
4.30	612	5.70	2,005	7.10	3,690	8.80	5,930
4.40	695	5.80	2,120	7.20	3,815	9.00	6,210
4.50	783	5.90	2,235	7.30	3,940	9.20	6,500
4.60	875	6.00	2,350	7.40	4,065	9.40	6,800
4.70	969	6.10	2,465	7.50	4,195	9.60	7,100
4.80	1,064	6.20	2,585	7.60	4,325	9.80	7,410
4.90	1,159	6.30	2,705	7.70	4,455	10.00	7,730
5.00	1,255	6.40	2,825	7.80	4,585	10.20	8,070
5.10	1,355	6.50	2,945	7.90	4,715	10.40	8,410
5.20	1,460	6.60	3,065	8.00	4,845	10.60	8,750
5.30	1,565	6.70	3,190	8.20	5,110	10.80	9,090
5.40	1,675	6.80	3,315	8.40	5,380	11.00	9,430
5.50	1,785	6.90	3,440	8.60	5,650	12.00	11,130
5.60	1,895	7.00	3,565				

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on 14 discharge measurements made 1903–1906, and is well defined between gage heights 3.9 feet and 10 feet.

Monthly discharge of Raritan River at Finderne, N. J., for 1907.

[Drainage area, 490 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	6,000	.....	1,380	2.82	3.25	B.
February	.....	.....	300	.612	.64	D.
March	9,770	.....	2,020	4.12	4.75	B.

NOTE.—Discharge during ice periods estimated on the basis of Raritan at Boundbrook and climatological reports:

	Second-feet.
Discharge January 24 to 31	675
March 1 to 13	500

RARITAN RIVER AT BOUNDBROOK, N. J.

This station, which was established September 12, 1903, and discontinued March 31, 1909, was located at the highway bridge just back of the Lehigh Valley railroad station at Boundbrook, N. J. The locality is 2½ miles below Millstone River and about 1,000 feet above Boundbrook, which enters from the northeast.

The records at this point are of value for determining the regimen of flow of Raritan River and, in conjunction with the records of the Finderne station, for determining the flow of Millstone River and solving problems connected with power, navigation, municipal water supply, and sewage disposal.

About 1½ miles below the station a dam diverts water into the Delaware and Raritan Canal for power plants about 5 miles below Boundbrook. The discharge of the canal near the gaging station is but a few second-feet each day—only the amount necessary for the lockage of canal boats. It is stated that the headgates below are regulated only at times of freshets and remain open during low and medium stages. It is probable, however, that the relation between discharge and gage heights is at times affected by this controlled flow.

The datum of the gage has remained unchanged since the establishment of the station. During the winter period the discharge is affected by ice. Conditions of flow are probably constant except for the effect of regulation at the dam below. A very good rating curve has been developed except for some measurements which plot a few per cent away from the curve. It seems probable that this deviation is caused by the controlled flow below.

Discharge measurements of Raritan River at Boundbrook, N. J., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 9	Henshaw and Barrows	.....	1,830	4.10	5,140
May 13	A. T. Barrows	374	1,010	2.00	1,480
September 2	R. H. Bolster	380	986	1.30	500

Daily gage height, in feet, of Raritan River at Boundbrook, N. J., for 1907–8.

[Joseph K. Tantem, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	5.55	1.85	1.3	1.8	1.75	1.4	1.45	1.05	1.3	2.75	2.35	2.2
2	2.95	1.85	1.35	1.75	1.65	2.3	1.3	1.1	1.45	2.3	2.25	2.15
3	2.6	2.0	2.5	1.7	1.6	2.55	1.3	1.1	1.2	1.95	4.65	2.0
4	2.75	1.8	2.55	1.65	2.65	1.95	1.25	1.05	1.3	2.0	2.75	2.0
5	2.85	1.6	2.2	1.65	2.5	1.75	1.2	1.0	1.8	2.05	2.35	1.85
6	2.35	1.5	2.05	1.6	2.05	1.75	1.2	1.05	1.8	1.85	2.8	1.9
7	2.3	1.9	1.75	1.6	2.05	1.7	1.2	1.05	1.4	1.7	7.5	1.8
8	2.35	1.8	1.8	2.35	1.95	1.65	1.85	1.05	1.3	3.45	3.9	1.8
9	2.25	1.8	2.0	2.35	2.0	1.45	1.3	1.05	1.3	3.1	3.1	1.8
10	2.0	1.7	2.5	2.5	2.05	1.4	1.15	1.2	1.45	2.25	2.95	3.75
11	2.0	1.7	2.0	2.25	2.55	1.4	1.3	1.15	1.45	2.05	2.95	4.15
12	2.75	1.7	1.9	2.0	2.15	1.4	1.4	1.05	1.7	1.95	2.55	2.7
13	3.75	1.7	2.3	2.15	1.85	1.35	1.25	1.0	1.6	1.75	2.35	2.4
14	3.9	1.7	5.2	2.1	1.75	1.3	1.2	1.0	1.45	1.65	2.15	2.35
15	3.75	1.7	7.9	1.85	1.75	1.4	1.15	1.0	1.5	1.6	2.05	4.35
16	2.8	1.6	6.45	1.75	1.9	1.35	1.1	1.0	1.35	1.55	2.0	3.65
17	2.35	1.55	5.1	1.65	4.15	1.3	1.05	1.0	1.35	1.5	1.95	3.05
18	3.95	1.5	5.55	1.6	2.65	1.25	1.3	1.0	1.35	1.5	1.9	2.55
19	4.0	1.5	4.15	1.6	2.25	1.2	1.5	.9	1.4	1.4	3.5	2.35
20	2.9	1.5	5.35	1.65	2.2	1.2	2.1	.9	1.4	1.4	2.65	2.15
21	3.15	1.5	4.0	1.6	2.1	1.2	1.95	.85	1.5	1.4	2.45	2.1
22	2.7	1.5	3.3	1.5	1.9	1.25	1.5	.95	1.5	1.4	2.95	2.0
23	3.3	1.5	3.05	1.5	1.8	1.2	1.35	.9	1.65	1.4	2.45	4.2
24	2.5	1.4	2.85	2.7	1.65	1.15	1.25	1.15	5.9	1.35	3.35	6.3
25	2.4	1.3	2.45	2.25	1.6	1.2	1.15	1.7	2.5	1.3	5.35	3.75
26	2.2	1.3	2.25	1.8	1.5	1.2	1.15	1.55	1.95	1.35	3.75	2.95
27	1.9	1.5	2.2	1.9	1.6	1.2	1.15	1.45	1.75	1.3	3.2	2.65
28	2.0	1.3	2.05	1.8	1.65	1.25	1.1	1.45	1.65	4.0	2.7	2.65
29	2.0	.....	2.1	1.7	1.6	1.25	1.05	1.4	7.5	5.85	2.5	2.45
30	1.85	.....	1.9	1.7	1.55	1.5	1.05	1.3	4.6	4.1	2.3	2.95
31	1.8	.....	1.8	.....	1.5	.....	1.05	1.4	.....	2.75	.....	2.35
1908.[b]												
1	2.45	3.6	2.0	1.95	2.75	2.1	1.2	1.15	1.25	1.15	2.0	1.45
2	2.25	4.15	1.85	1.85	1.85	1.85	1.1	1.1	1.25	1.15	1.85	1.4
3	2.05	2.45	1.95	1.95	1.75	1.75	1.1	1.05	1.25	1.1	1.8	1.35
4	2.0	2.4	2.1	1.8	1.6	1.6	1.3	1.05	1.25	1.1	1.7	1.4
5	2.0	2.0	1.85	1.6	1.4	1.6	1.25	1.1	1.1	1.0	1.6	1.4
6	1.7	2.4	1.9	1.7	1.5	1.5	1.3	1.0	1.1	1.0	1.55	1.4
7	2.05	2.75	2.65	1.6	3.25	1.5	1.2	1.15	1.3	.95	1.5	3.5
8	5.05	2.25	3.0	1.7	7.0	1.45	1.15	1.35	1.25	1.0	1.5	3.45
9	2.85	2.0	3.95	2.35	4.5	1.4	1.1	1.35	1.25	1.05	1.5	2.4
10	2.15	2.0	2.75	1.8	3.05	1.4	1.1	1.4	1.15	1.0	1.5	2.1
11	2.05	2.0	2.4	1.75	2.55	1.3	1.2	1.3	1.15	1.05	1.5	1.9
12	4.7	1.9	2.3	1.65	2.1	1.3	1.1	1.3	1.15	1.0	1.5	2.2
13	6.4	1.9	2.25	1.65	1.95	1.3	1.25	1.15	1.1	1.0	1.4	2.05
14	4.2	3.75	2.35	1.6	1.95	1.3	1.1	1.2	1.2	1.0	1.4	1.9
15	3.0	6.75	2.25	1.5	3.0	1.3	1.1	1.25	1.1	.95	1.5	1.8
16	2.6	5.3	2.45	1.75	4.5	2.65	1.2	1.05	1.1	.95	1.5	1.8
17	2.4	2.95	2.05	1.5	2.6	2.2	1.1	1.0	1.1	.95	1.5	1.8
18	2.3	2.15	2.25	1.6	2.55	1.95	1.1	1.0	1.0	.95	1.5	1.85
19	2.1	2.25	5.15	1.6	2.2	1.65	1.1	1.0	1.1	.95	1.6	2.0
20	2.0	5.5	3.45	1.55	3.15	1.5	1.1	1.1	.95	1.3	1.85	2.0
21	2.0	3.3	2.6	1.55	3.6	1.35	1.2	1.0	.95	1.35	1.75	1.9
22	2.0	2.55	2.25	1.4	4.7	1.3	1.1	1.0	.95	1.3	1.7	1.8
23	2.0	2.1	2.25	1.5	4.2	1.25	1.3	1.15	.95	1.35	1.6	1.7
24	1.85	2.0	2.5	1.45	3.0	1.2	1.85	1.15	1.05	1.35	1.6	1.65
25	1.8	2.25	2.15	1.4	2.45	1.2	1.65	1.2	.95	1.5	1.6	1.7
26	2.6	4.75	2.0	1.4	2.15	1.25	2.3	3.0	.95	1.8	1.6	1.7
27	2.3	5.7	1.85	1.3	2.05	1.2	1.6	3.05	.95	3.1	1.55	1.6
28	2.35	2.95	1.95	1.4	1.95	1.2	1.4	2.2	.95	2.05	1.5	1.6
29	2.0	2.2	2.05	1.4	1.75	1.2	1.3	1.8	1.5	2.85	1.5	1.5
30	2.05	.....	1.95	1.3	1.75	1.2	1.2	1.65	1.3	3.15	1.4	1.45
31	1.95	.....	1.9	.....	3.05	.....	1.3	1.35	.....	2.3	.....	1.75

[a] Ice conditions prevailed from about January 18 to March 13, 1907, except January 20 to 22, which were probably open.

[b] Discharge probably slightly affected by ice conditions for brief periods during the latter part of January, the first part of February, and portions of December, 1908.

Rating table for Raritan River at Boundbrook, N. J., for 1903–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	140	2.10	1,440	3.40	3,610	5.40	7,980
.90	205	2.20	1,580	3.50	3,800	5.60	8,480
1.00	275	2.30	1,730	3.60	4,000	5.80	8,980
1.10	350	2.40	1,890	3.70	4,200	6.00	9,500
1.20	430	2.50	2,050	3.80	4,400	6.20	10,030
1.30	520	2.60	2,210	3.90	4,600	6.40	10,570
1.40	615	2.70	2,370	4.00	4,800	6.60	11,120
1.50	715	2.80	2,540	4.20	5,220	6.80	11,680
1.60	820	2.90	2,710	4.40	5,660	7.00	12,250
1.70	930	3.00	2,880	4.60	6,100	8.00	15,200
1.80	1,050	3.10	3,060	4.80	6,560		
1.90	1,170	3.20	3,240	5.00	7,020		
2.00	1,300	3.30	3,420	5.20	7,500		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on 15 discharge measurements made during 1903–1908 and is well defined between gage heights 1.0 foot and 4.0 feet. The extension is based on one high-water measurement at gage height 7.35 feet.

Monthly discharge of Raritan River at Boundbrook, N. J., for 1907–8.

[Drainage area, 800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.[a]						
January	8,360	.....	2,240	2.80	3.23	C.
February	.....	.....	500	.625	.65	D.
March	14,900	.....	3,140	3.92	4.52	C.
April	2,370	715	1,160	1.45	1.62	B.
May	5,120	715	1,360	1.70	1.96	B.
June	2,130	390	694	.868	.97	B.
July	1,440	312	539	.674	.78	B.
August	930	172	381	.476	.55	C.
September	13,700	430	1,660	2.08	2.32	B.
October	9,110	520	1,700	2.12	2.44	B.
November	13,700	1,170	3,060	3.82	4.26	B.
December	10,300	1,050	2,620	3.28	3.78	B.
The year	14,900	172	1,590	1.98	27.08	
1908.[b]						
January	10,600	930	2,320	2.90	3.34	C.
February	11,500	1,170	3,230	4.04	4.36	C.
March	7,380	1,110	1,970	2.46	2.84	B.
April	1,810	520	855	1.07	1.19	B.
May	12,200	615	2,720	3.40	3.92	B.
June	2,290	430	747	.934	1.04	B.
July	1,730	350	512	.640	.74	B.
August	2,970	275	633	.791	.91	B.
September	715	240	372	.465	.52	C.
October	3,150	240	707	.884	1.02	B.
November	1,300	615	810	1.01	1.13	B.
December	3,800	568	1,180	1.48	1.71	C.
The year	12,200	240	1,340	1.67	22.72	

[a] Discharge during the frozen period, 1907, estimated on the basis of the discharge at Finderne and climatological reports.

	Second-feet.
Discharge January 18 to 19, 1907	1,450
January 23 to 31, 1907	1,440
February 1 to 28, 1907	500
March 1 to 13, 1907	900

[b] The open-channel rating was applied throughout 1908. Values above for January, February, and December may be slightly in excess on account of ice conditions.

DELAWARE RIVER DRAINAGE BASIN.

DESCRIPTION.

The headwaters of Delaware River are found in Delaware, Greene, and Schoharie counties, N. Y. The East Branch, which may be considered the main stream, rises at Grand Gorge in northeastern Delaware County; the West Branch [a] has its source in a small lake almost on the line of Schoharie and Delaware counties, at an elevation of 1,886 feet above tide; the two streams unite at Hancock. From this junction point the river flows southeastward until it reaches Port Jervis, where it turns to the southwest and flows for a distance of about 40 miles along the base of the Shawangunk Range until it passes through the water gap, from which point it flows in an irregular southerly direction to Trenton. Below Trenton its course is in general southwestward to Delaware Bay. Between Hancock and Port Jervis it forms the dividing line between New York and Pennsylvania; south of Port Jervis it separates Pennsylvania from New Jersey and, for a few miles, Delaware from New Jersey.

The drainage area of Delaware River, measured at Philadelphia and including that of Schuylkill River, is about 10,100 square miles, of which about 2,580 square miles lie in New York, 5,720 in Pennsylvania, and 1,800 in New Jersey. The river is tidal to Trenton, which lies also at the head of navigation.

The Delaware receives a number of important tributaries, among which may be mentioned Mongaup and Neversink rivers and Callicoon Creek from New York; Lackawaxen, Lehigh, and Schuylkill rivers and numerous creeks from Pennsylvania, and Rancocas Creek, Musconetcong River, and Maurice River from New Jersey.

Gaging stations have been maintained in the Delaware Basin at the following points:

East Branch Delaware River at Hancock, N. J. (1902–1908).
Delaware River at Port Jervis, N. Y. (1904–1908).
Delaware River at Riegelsville, N. J. (1906–1908).
Delaware River at Lambertville, N. J. (1897–1908).
West Branch Delaware River at Hancock, N. Y. (1902–1908).
Neversink River at Godeffroy, N. Y. (1903).
Neversink River at Port Jervis, N. Y. (1902–1903).
Paulins Kill at Columbia, N. J. (1908).
Lehigh River at South Bethlehem, Pa. (1902–1905).
Musconetcong River at Asbury, N. J. (1903).
Musconetcong River near Bloomsbury, N. J. (1903–1907).
Tohickon Creek at Point Pleasant, Pa. (1883–1908).
Neshaminy Creek below Forks, Pa. (1884–1908).
Schuylkill River near Philadelphia, Pa. (1898–1908).
Perkiomen Creek near Frederick, Pa. (1884–1908).
Wissahickon Creek at Philadelphia, Pa. (1897–1906).

[a] This branch was formerly described as the main stream, but recent careful measurements show the drainage area of the East Branch to be considerably larger than that of the West Branch.

EAST BRANCH OF DELAWARE RIVER AT HANCOCK, N. Y.

This station is located at the highway bridge one-half mile southeast of the Erie Railroad station at Hancock, N. Y., and about 1 mile above the junction of the East and West branches of Delaware River. The Erie Railroad bridge is just below the gaging station. It was established October 14, 1902, and has since been maintained in cooperation with the New York State engineer department, and during the last year with the United States Weather Bureau.

The station was established to obtain general statistical and comparative data regarding the flow of Delaware River for power and navigation purposes.

Beaver Kill, which drains a portion of Sullivan and Ulster counties, is the nearest important tributary to East Branch of Delaware River. It enters from the left about 10 miles above the gaging station.

The datum of the chain gage has remained the same since the establishment of the station. Conditions for accurate ratings can not be considered good. The high-water stage of East Branch is probably affected by backwater due to gorging at its junction with West Branch. Low-water discharge is controlled by a rift just below the Erie Railroad bridge, but frequent changes in conditions of flow require many measurements and new ratings each year. During the winter months the discharge is affected by needle ice jamming on these rifts and causing backwater at the station.

Information in regard to this station is contained in the annual reports of the state water supply commission, of New York, and of the state engineer and surveyor, State of New York.

Discharge measurements of East Branch Delaware River at Hancock, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 21	Wood and Hoyt	283	726	3.30	955
1908.					
September 4	C. R. Adams	178	242	2.34	90.5
September 27	do	178	248	2.27	69.7
October 23	Wood and French	259	362	2.52	162

Daily gage height, in feet, of East Branch Delaware River at Hancock, N. Y., for 1907–8.

[D. B. Van Etten, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	6.65	.....	.....	5.0	4.3	3.5	.....	.....	2.2	3.5	4.8	3.6
2	5.4	.....	.....	4.7	4.15	3.55	.....	.....	2.2	3.3	4.6	3.5
3	4.95	.....	.....	4.5	4.10	4.05	.....	.....	2.3	3.1	6.8	3.5
4	5.15	.....	.....	4.3	4.05	3.8	.....	.....	2.6	3.2	6.0	3.5
5	5.3	.....	.....	4.25	4.5	3.7	.....	.....	2.8	5.1	5.8	3.4
6	4.85	.....	.....	4.15	4.15	4.15	.....	.....	2.7	4.4	4.9	3.3
7	4.7	.....	.....	3.95	4.3	4.1	.....	.....	2.7	4.1	8.8	3.4
8	5.4	.....	.....	3.9	4.55	4.0	.....	2.5	2.6	3.9	8.3	3.6
9	5.35	.....	.....	4.0	4.45	3.9	.....	2.4	2.5	4.9	6.4	3.5
10	4.85	.....	.....	4.0	4.45	3.8	.....	2.4	2.6	4.3	5.6	4.7
11	4.75	.....	.....	3.9	4.3	3.7	.....	2.4	2.8	4.1	5.3	10.4
12	4.5	.....	.....	4.15	4.2	3.65	.....	2.4	4.1	4.0	4.9	7.1
13	4.4	.....	.....	4.1	4.1	3.6	.....	2.3	3.5	4.0	4.6	5.7
14	4.3	.....	.....	4.3	3.95	3.5	.....	2.3	3.1	3.8	4.5	5.2
15	4.45	.....	7.7	4.15	3.85	3.45	.....	2.3	2.9	3.7	4.3	4.9
16	4.15	.....	6.0	4.05	3.85	3.35	.....	2.3	2.8	3.6	4.1	4.7
17	4.3	.....	5.65	4.0	4.3	3.3	.....	2.3	2.7	3.5	4.0	4.5
18	3.8	.....	5.55	3.95	4.15	3.2	.....	2.3	2.7	3.4	3.9	4.4
19	4.2	.....	5.65	3.9	4.0	3.2	.....	2.3	2.6	3.3	3.8	4.2
20	4.7	.....	4.8	3.85	3.95	3.5	.....	2.3	2.6	3.3	3.8	4.0
21	4.95	.....	4.55	3.75	3.8	3.35	.....	2.3	2.6	3.2	3.7	4.0
22	4.15	.....	4.75	3.7	3.7	3.15	.....	2.2	2.6	3.4	3.8	3.9
23	3.85	.....	6.3	3.75	3.7	3.05	.....	2.2	2.7	3.3	3.8	4.1
24	4.75	.....	7.0	4.3	3.65	3.0	.....	2.3	2.8	3.4	3.7	8.5
25	8.25	.....	6.15	4.95	3.55	2.95	.....	2.3	3.1	3.4	3.7	6.4
26	5.25	.....	5.75	4.8	3.55	2.9	.....	2.3	2.9	3.3	3.7	5.4
27	.....	.....	5.45	4.75	3.75	2.9	.....	2.3	2.8	3.2	3.7	5.0
28	.....	.....	5.95	4.55	3.9	3.0	.....	2.3	2.7	3.6	3.6	4.9
29	.....	.....	6.4	4.4	3.75	2.9	.....	2.3	2.8	7.4	3.6	5.3
30	.....	.....	6.1	4.3	3.6	3.05	.....	2.2	3.6	6.1	3.6	4.8
31	.....	.....	5.4	.....	3.6	.....	.....	2.2	.....	5.3	.....	5.3
1908.[b]												
1	4.8	4.4	3.5	5.6	6.3	3.9	2.7	2.8	2.4	3.0	3.7	3.0
2	4.6	3.8	4.0	5.6	5.8	3.7	2.6	2.6	2.3	2.8	3.6	3.0
3	4.4	3.7	4.4	5.2	5.7	3.5	3.2	2.7	2.4	3.0	3.4	2.9
4	4.2	3.9	4.0	4.9	5.4	3.5	2.8	2.6	2.3	2.8	3.4	3.1
5	4.3	3.9	3.7	4.7	5.0	3.4	3.2	2.7	2.4	2.8	3.3	3.4
6	6.2	4.8	3.5	4.6	4.7	3.2	3.1	2.7	2.4	2.8	3.3	3.2
7	6.2	4.9	3.5	4.9	4.6	3.2	2.8	2.6	2.4	2.6	3.2	3.1
8	6.3	4.9	3.5	5.1	6.4	3.2	2.9	2.7	2.5	2.6	3.2	4.2
9	4.0	4.7	3.4	6.8	5.7	3.0	2.7	2.6	2.3	2.5	3.2	3.7
10	3.7	4.8	3.6	6.3	5.6	3.2	2.7	2.6	2.4	2.6	3.2	3.7
11	3.6	4.7	3.6	5.7	5.2	3.3	2.7	2.6	2.4	2.7	3.2	3.3
12	3.8	4.6	3.5	5.4	4.8	3.0	2.6	2.5	2.3	2.7	3.2	3.4
13	5.6	4.7	4.1	5.1	4.7	3.1	2.6	2.5	2.4	2.8	3.3	3.5
14	5.2	4.7	6.4	4.9	4.5	3.0	2.5	2.4	2.3	2.6	3.2	3.6
15	4.4	5.0	6.0	4.5	4.5	2.9	2.6	2.5	2.4	2.7	3.2	3.4
16	4.4	10.7	7.3	5.6	4.4	3.1	2.6	2.5	2.4	2.7	3.2	3.4
17	4.1	6.4	5.5	5.1	4.2	3.3	2.5	2.4	2.3	2.6	3.2	3.3
18	3.9	5.6	4.8	4.8	4.0	3.0	2.6	2.6	2.3	2.6	3.2	3.4
19	3.9	4.8	4.9	5.0	3.9	3.0	2.5	2.5	2.2	2.5	3.3	3.9
20	3.7	4.4	5.1	5.2	3.8	2.9	2.7	2.5	2.3	2.6	3.2	3.6
21	3.7	4.1	4.4	4.8	3.8	2.8	2.6	2.4	2.3	2.6	3.2	3.4
22	3.7	4.2	4.6	4.7	3.8	2.8	2.5	2.4	2.2	2.5	3.1	3.4
23	3.7	3.7	4.5	4.6	5.3	2.8	2.6	2.5	2.3	2.6	3.1	3.5
24	3.5	3.6	5.3	4.4	4.8	2.7	2.5	2.4	2.3	2.5	3.1	3.3
25	3.4	3.6	6.4	4.4	4.5	2.8	3.6	2.5	2.4	2.5	3.1	3.5
26	3.8	3.6	5.5	4.4	4.3	2.9	3.9	2.4	2.3	2.5	3.1	3.3
27	3.7	4.1	6.2	4.2	4.1	2.7	3.2	2.4	2.2	3.1	3.1	3.2
28	3.5	3.9	7.9	4.5	4.0	2.8	3.1	2.5	2.3	3.5	3.1	3.5
29	3.5	3.1	9.2	4.5	3.9	2.7	2.9	2.4	2.8	5.2	3.1	3.4
30	3.2	.....	7.5	4.2	3.8	2.6	2.9	2.4	3.4	4.4	3.0	3.3
31	3.9	.....	6.4	.....	3.9	.....	2.8	2.4	.....	4.0	.....	3.4

[a] Ice conditions prevailed from about January 24 to about March 15, 1907.
[b] Ice conditions January 6 to 8, January 31 to February 15, March 2 to 3, and December 4 to 31, 1908.

Rating tables for East Branch Delaware River at Hancock, N. Y.

1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.20	104	3.60	1,340	5.00	4,000	6.80	9,460
2.30	143	3.70	1,480	5.10	4,240	7.00	10,210
2.40	187	3.80	1,630	5.20	4,490	7.20	10,980
2.50	237	3.90	1,790	5.30	4,750	7.40	11,760
2.60	295	4.00	1,960	5.40	5,020	7.60	12,560
2.70	360	4.10	2,130	5.50	5,290	7.80	13,360
2.80	435	4.20	2,310	5.60	5,570	8.00	14,200
2.90	520	4.30	2,500	5.70	5,850	8.20	15,040
3.00	615	4.40	2,690	5.80	6,140	8.40	15,920
3.10	720	4.50	2,890	5.90	6,435	8.60	16,820
3.20	830	4.60	3,100	6.00	6,735	8.80	17,760
3.30	950	4.70	3,320	6.20	7,365	9.00	18,740
3.40	1,070	4.80	3,540	6.40	8,025	10.00	23,960
3.50	1,200	4.90	3,770	6.60	8,730	11.00	29,520

NOTE.—This table is not applicable for ice or obstructed channel conditions. It is based on 1 discharge measurement made during 1907, the form of the 1908 rating curve, and intercomparisons of discharge at Port Jervis and adjoining stations. It is fairly well defined below gage height 8 feet. The above table has been revised, and differs considerably from that published in the report of the state engineer and surveyor, State of New York, on the basis of recent studies and intercomparisons.

1908.

2.20	53	3.10	525	4.00	1,770	4.90	3,710
2.30	80	3.20	620	4.10	1,960	5.00	3,960
2.40	113	3.30	725	4.20	2,150	5.10	4,215
2.50	153	3.40	840	4.30	2,350	5.20	4,475
2.60	198	3.50	970	4.40	2,560	5.30	4,740
2.70	248	3.60	1,110	4.50	2,780	5.40	5,010
2.80	304	3.70	1,260	4.60	3,000	5.50	5,285
2.90	367	3.80	1,420	4.70	3,230	5.60	5,565
3.00	440	3.90	1,590	4.80	3,470		

NOTE.—This table is not applicable for ice or obstructed channel conditions. It is based on 3 discharge measurements made during 1908, and on the form of earlier rating curves. It is well defined below gage height 8 feet. Above gage height 5.6 feet it is the same as the 1907 table.

Monthly discharge of East Branch Delaware River at Hancock, N. Y., for 1907–8.

[Drainage area, 920 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.[a]						
January	8,910	.....	2,810	3.05	3.52	B.
February	.....	.....	450	.489	.51	D.
March	10,200	.....	3,570	3.88	4.47	B.
April	4,000	1,480	2,380	2.59	2.89	B.
May	3,000	1,270	2,000	2.17	2.50	B.
June	2,220	520	1,170	1.27	1.42	A.
July	.....	.....	500	.543	.63	C.
August	.....	104	182	.198	.23	C.
September	2,130	104	486	.528	.59	B.
October	11,800	720	2,170	2.36	2.72	B.
November	17,800	1,340	4,020	4.37	4.88	B.
December	26,100	950	4,320	4.70	5.42	B.
The year	26,100	104	2,000	2.18	29.78	
1908.[b]						
January	5,560	620	1,830	1.99	2.29	B.
February	27,800	.....	2,370	2.58	2.78	B.
March	19,700	840	4,680	5.09	5.87	A.
April	9,460	2,150	4,040	4.39	4.90	B.
May	8,020	1,420	3,390	3.68	4.24	B.
June	1,590	198	546	.593	.66	B.
July	1,590	153	362	.393	.45	A.
August	304	113	167	.182	.21	A.
September	840	53	125	.136	.15	A.
October	4,480	153	529	.575	.66	A.
November	1,260	440	655	.712	.79	B.
December	.....	.....	350	.380	.44	D.
The year	27,800	53	1,590	1.73	23.44	

[a] Discharge during the frozen period and July 1 to August 7, 1907, estimated on the basis of the discharge of West Branch Delaware River at Hancock, N. Y., Delaware River at Port Jervis, N. Y., and climatological reports.

		Second-feet.
Discharge	January 24 to 31, 1907	700
	March 1 to 14, 1907	300
	March 15, 1907	10,000
	August 1 to 7, 1907	300

See rating table footnote.

[b] Discharge during the periods of ice conditions for 1908 determined from Delaware River at Port Jervis and West Branch Delaware River at Hancock.

		Second-feet.
Discharge	January 6 to 8, 1908	1,500
	January 31, 1908	620
	February 1 to 15, 1908	573
	March 2 to 3, 1908	1,000
	December 4 to 31, 1908	343

DELAWARE RIVER AT PORT JERVIS, N. Y.

This station is located at the toll bridge over the Delaware River at Port Jervis. It was established for the United States Weather Bureau by Irving Righter, city engineer, Port Jervis, N. Y., October 12, 1904.

This station is maintained for the purpose of flood predictions by the Weather Bureau and the records of gage heights are supplied to the Geological Survey for the purpose of determining the regimen of flow of the upper Delaware drainage.

Mongaup River enters the Delaware from the north about 6 miles above the station, and Neversink River, also from the north, enters about 1 mile below the station.

The river section is affected by ice to a greater or less extent each winter.

Considerable difficulty has been experienced in maintaining the datum of the chain gage constant. September 4, 1908, a careful investigation was made and in order to avoid negative readings a change in the original datum, as nearly as it could be determined, of about 2 feet was made. The new chain length set on this date was 36.47 feet from rivet marker to the end of the weight. The relation between the gage datum and the following bench marks was determined.

Port Jervis city bench mark, from which the gage was originally established, is a cross located on the doorsill of the schoolhouse on Thompson street near Water street. Elevation above gage datum, 27.75 feet.

Bench mark No. 2, top of downstream left corner of pier. Elevation above gage datum, 29.92 feet.

Bench mark No. 3, top of right abutment at apex of angle caused by junction of downstream wing wall. Elevation above gage datum, 29.02 feet.

The elevation of the datum of the gage is 414.89 feet above mean sea level. A varying correction of from +1.7 to +2.0 feet has been applied to gage heights prior to September 4, 1908, as given below.

Conditions of flow at this point are constant and a good rating has been developed for low and medium stages. Careful comparisons of this station with the Riegelsville and the two Hancock stations indicate that the corrections applied to the gage heights were essentially correct and that the discharge data can be fully relied on.

Information in regard to this station is contained in the annual reports of the state water supply commission, of New York, and of the state engineer and surveyor, State of New York.

Discharge measurements of Delaware River at Port Jervis, N. Y., in 1906–1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1906.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
November 2	Hoyt and Cooke	569	2,680	3.49	4,350
November 5	C. H. Cooke	568	2,380	2.99	3,480
November 10	do	540	2,100	2.59	2,440
November 12	do	550	2,240	2.79	2,820
November 19	do	590	2,890	3.89	7,540
1907.					
January 5	C. H. Cooke	605	4,410	6.28	15,400
1908.					
May 10	Henshaw and Barrows	627	4,850	7.08	20,500
May 11	do	611	4,310	6.27	15,700
August 29 [a]	C. E. Ryder	503	1,200	1.00	407
September 3 [a]	R. H. Bolster	490	1,060	.85	310
September 5 [a]	G. C. Stevens	491	1,080	.89	315
September 20 [b]	K. C. Grant	.....	.....	.69	226

[a] Measured from upstream side of bridge. [b] Left channel measured by wading.

Daily gage height, in feet, of Delaware River at Port Jervis, N. Y., for 1904–1908.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1904.[a]				1904.[a]				1904.[a]			
1	.....	3.3	3.1	11	.....	2.7	2.5	21	3.0	2.8	2.7
2	.....	3.2	3.1	12	.....	2.7	2.5	22	10.7	3.6	2.9
3	.....	3.1	3.1	13	2.7	2.7	2.7	23	7.5	3.2	2.7
4	.....	3.0	3.1	14	3.8	2.9	2.9	24	6.1	4.0	2.8
5	.....	3.0	2.9	15	3.7	2.8	2.6	25	5.3	3.8	3.1
6	.....	2.9	2.8	16	3.3	2.8	3.1	26	4.7	3.8	3.6
7	.....	2.8	2.6	17	3.1	2.8	2.8	27	4.5	3.6	3.7
8	.....	2.9	2.6	18	3.0	2.9	2.8	28	4.2	3.3	3.8
9	.....	2.8	2.6	19	2.9	2.8	2.9	29	3.9	3.1	7.5
10	.....	2.8	2.5	20	2.8	2.8	2.9	30	3.5	3.1	5.6
								31	3.4	.....	5.0

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.[b]												
1	4.5	2.9	.....	8.0	3.2	2.3	1.9	2.6	3.8	2.7	2.8	6.0
2	4.6	2.7	.....	7.0	3.2	2.1	1.9	2.6	3.0	2.6	2.8	4.7
3	4.9	3.3	.....	6.1	3.1	2.1	2.0	2.5	2.9	2.5	2.7	4.6
4	5.0	3.4	.....	5.6	3.0	2.1	3.3	2.4	3.9	2.5	2.6	10.3
5	4.1	3.4	.....	5.4	2.9	2.1	2.8	2.3	5.7	2.7	2.6	7.8
6	4.1	.....	.....	5.6	2.8	2.1	2.4	2.1	4.9	2.6	2.6	6.3
7	5.4	.....	.....	6.2	2.9	2.2	2.2	2.0	4.3	2.5	2.7	5.5
8	9.5	.....	.....	5.8	3.0	3.3	2.1	1.9	3.8	2.3	3.2	5.1
9	7.8	.....	.....	5.4	3.0	3.1	2.1	1.7	3.4	2.2	3.1	4.7
10	6.5	.....	.....	5.1	2.8	2.9	1.9	1.9	3.2	2.2	3.1	4.4
11	5.7	.....	.....	5.0	2.7	2.7	2.1	1.9	2.9	2.1	3.0	4.1
12	5.1	.....	.....	5.0	2.7	2.7	1.9	1.7	4.5	3.2	2.9	3.9
13	5.1	.....	.....	5.3	2.8	2.6	1.9	1.6	5.8	4.5	2.8	3.8
14	5.9	.....	.....	4.9	3.0	2.8	1.8	1.9	4.7	4.1	2.8	3.6
15	4.8	.....	.....	4.6	2.8	2.8	1.8	2.4	4.1	3.8	2.7	3.4
16	4.8	.....	.....	4.5	2.8	2.7	1.	2.4	3.7	3.2	2.7	3.3
17	4.6	.....	.....	4.2	2.8	2.6	1.9	3.0	3.4	3.0	2.6	3.2
18	3.7	.....	.....	4.1	2.9	2.5	1.9	3.1	3.4	2.9	2.6	2.9
19	3.8	.....	5.1	4.0	2.9	2.1	1.8	2.8	3.4	2.8	2.6	2.9
20	4.0	.....	10.7	3.8	2.8	2.2	1.7	2.4	4.1	2.9	2.5	3.0
21	3.8	.....	9.5	3.9	2.8	2.4	1.6	2.2	4.1	4.1	2.4	3.2
22	3.6	.....	8.5	4.1	2.7	2.4	1.9	2.1	4.9	4.0	2.3	4.1
23	3.4	.....	8.1	4.1	2.7	2.6	1.9	2.1	4.3	3.6	2.3	4.6
24	3.2	.....	7.7	3.8	2.6	2.8	1.7	2.0	3.8	3.3	2.3	4.2
25	3.0	.....	7.8	3.6	2.6	2.8	1.7	2.0	3.6	3.3	2.3	3.7
26	3.0	.....	11.6	3.5	2.5	2.6	1.6	2.1	3.3	3.2	2.3	3.5
27	3.0	.....	10.9	3.5	2.4	2.4	1.7	2.0	3.2	3.1	2.2	3.2
28	3.0	.....	11.0	3.4	2.5	2.3	1.7	1.9	3.0	3.1	2.2	3.1
29	2.7	.....	9.6	3.3	2.4	2.1	1.7	1.9	2.9	3.0	2.4	3.2
30	3.2	.....	9.2	3.3	2.4	2.0	1.7	1.7	2.8	2.9	6.0	3.7
31	3.1	.....	8.8	.....	2.3	.....	2.2	1.9	.....	2.8	.....	3.7
1906.[c]												
1	3.5	3.7	3.7	6.9	3.6	4.2	3.3	3.2	2.6	1.8	3.5	3.3
2	3.1	3.6	3.2	6.2	3.5	4.0	3.5	2.9	2.5	2.0	3.5	3.3
3	3.0	3.5	3.5	5.7	3.5	3.7	3.8	2.7	2.5	2.0	3.4	3.1
4	2.9	3.5	9.1	5.7	3.6	3.6	4.0	3.3	2.4	1.8	3.2	2.7
5	3.4	2.7	9.3	6.2	3.6	3.3	4.1	3.1	2.3	1.8	3.0	2.9
6	4.3	2.8	6.3	7.1	3.5	3.9	3.8	3.0	2.2	2.1	3.0	2.8
7	3.7	2.6	5.6	7.3	3.4	4.5	3.4	2.7	2.0	2.2	3.0	4.9
8	3.3	2.5	5.1	6.3	3.4	4.2	3.1	2.6	1.9	2.1	2.8	5.0
9	3.1	2.4	4.8	5.9	3.4	4.1	2.9	3.5	1.9	2.1	2.7	3.9
10	2.8	.....	4.8	6.9	3.5	3.9	2.8	3.2	1.9	2.2	2.6	3.5
11	2.9	.....	4.4	9.0	3.5	4.9	2.8	2.9	1.8	2.1	2.6	4.1
12	2.8	.....	4.1	8.1	3.5	4.8	2.6	2.7	1.8	2.1	2.8	4.0
13	3.3	.....	4.0	7.1	3.3	4.1	2.4	2.5	1.8	2.1	3.0	3.7
14	3.4	.....	3.7	6.5	3.2	3.8	2.3	2.4	2.0	2.1	3.0	3.6
15	3.6	.....	3.5	7.9	3.2	3.6	2.2	2.3	2.1	2.0	2.9	3.7

[a] Ice conditions in left channel from about December 13 to 28, 1904.
[b] Ice conditions from about January 24 to March 18, 1905.
[c] River frozen February 10 to 22, 1906. It is not probable that ice conditions materially affected the flow at any other period.

Daily gage height, in feet, of Delaware River at Port Jervis, N. Y., for 1904–1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.												
16	3.3	.....	3.5	11.4	3.2	3.5	2.2	2.2	2.1	1.9	2.8	3.7
17	3.3	.....	3.3	8.9	3.1	3.7	2.2	2.1	2.1	1.9	2.8	4.3
18	3.2	.....	3.3	7.4	3.3	5.2	2.2	2.0	2.2	1.9	2.9	4.1
19	3.1	.....	3.2	6.5	3.8	6.3	2.3	1.9	2.2	1.9	3.9	3.6
20	3.1	.....	3.2	5.9	3.5	5.7	2.3	1.9	2.2	2.0	6.7	3.3
21	2.9	.....	2.9	5.5	3.3	5.5	2.3	1.9	1.9	5.2	5.9	3.2
22	3.3	.....	3.0	5.1	3.1	4.7	3.3	2.0	2.3	4.7	5.7	4.0
23	5.7	5.7	2.9	4.8	2.9	4.4	3.5	2.9	2.2	4.0	5.3	3.8
24	6.3	5.1	2.7	5.1	2.9	4.1	3.5	2.8	2.1	3.7	4.8	3.3
25	6.7	5.0	2.7	4.7	2.8	3.9	3.2	2.5	2.4	3.6	4.6	2.8
26	5.5	6.2	2.7	4.5	2.7	3.6	2.9	2.4	2.1	4.0	4.1	2.8
27	4.8	5.6	3.0	4.3	2.6	3.3	2.6	2.4	1.9	4.2	4.0	3.0
28	4.7	4.7	4.7	4.1	4.2	3.1	2.5	2.3	1.8	3.8	3.8	3.3
29	4.6	.....	7.4	3.9	5.5	3.0	2.5	3.7	1.8	3.9	3.7	3.3
30	4.1	.....	6.4	3.7	5.4	3.4	2.5	3.3	1.8	3.7	3.5	3.3
31	3.8	.....	6.5	.....	5.6	.....	3.1	2.9	.....	3.5	.....	3.4
1907.[a]												
1	9.0	3.4	4.1	5.4	4.2	3.0	2.7	1.5	0.9	3.3	4.8	3.4
2	7.2	3.3	4.3	5.0	4.0	3.0	2.7	1.4	.9	3.2	4.4	3.3
3	5.9	3.4	4.6	4.5	4.0	3.9	2.5	1.5	.8	2.9	5.2	3.3
4	5.5	3.5	4.5	4.3	3.8	3.9	2.3	1.3	.9	2.8	6.6	3.1
5	6.2	3.2	4.1	4.1	4.1	3.7	2.2	1.4	1.3	3.3	5.8	2.8
6	5.7	3.3	3.8	3.8	4.1	3.7	2.0	1.3	1.7	4.5	5.3	2.9
7	5.1	2.9	3.9	3.8	3.9	3.7	2.1	1.4	2.2	4.1	8.0	2.8
8	5.1	3.0	4.1	3.6	4.2	3.8	2.1	1.5	1.9	3.7	10.7	2.8
9	6.7	2.9	4.4	3.6	4.4	3.5	2.4	1.4	1.8	4.0	8.2	2.9
10	5.7	2.7	4.3	3.9	4.3	3.4	2.0	1.4	1.6	4.5	6.8	3.9
11	5.2	2.9	4.6	4.0	4.2	3.3	2.0	1.4	1.8	3.9	6.1	13.1
12	4.9	2.9	4.0	3.9	3.9	3.1	1.9	1.3	3.0	3.8	5.6	9.5
13	4.6	.....	4.2	4.2	3.8	3.1	2.1	1.3	3.7	3.5	5.1	7.1
14	4.4	.....	4.4	4.4	3.5	2.9	2.4	1.2	3.2	3.5	4.7	6.1
15	4.4	.....	5.4	4.2	3.6	2.9	2.4	1.1	2.6	3.2	4.4	5.8
16	4.5	4.0	7.2	4.1	3.4	2.8	2.1	1.1	2.2	3.0	4.1	5.4
17	4.3	3.8	6.6	3.8	3.5	2.6	2.0	1.1	2.2	3.0	3.9	5.4
18	3.5	3.9	6.7	3.8	3.9	2.5	1.9	1.3	1.9	2.8	3.7	4.8
19	3.7	4.0	7.3	3.8	3.6	2.4	2.0	1.4	2.0	2.8	3.6	4.4
20	4.3	3.9	5.9	3.6	3.5	2.4	1.8	1.2	1.9	2.5	3.6	4.2
21	6.5	3.8	5.4	3.5	3.4	2.6	2.2	1.1	2.0	2.6	3.6	4.0
22	5.2	4.2	5.7	3.4	3.2	2.6	1.9	1.1	2.0	2.7	3.6	3.9
23	4.3	4.2	7.5	3.3	3.1	2.5	1.9	1.1	2.0	2.7	3.6	3.8
24	4.3	4.0	8.9	3.4	3.0	2.2	1.8	1.2	2.6	2.7	3.6	7.0
25	3.7	3.8	8.0	4.3	3.0	2.3	1.8	1.2	2.9	2.6	3.4	8.4
26	3.8	2.7	7.1	4.7	2.9	2.2	1.7	1.2	2.9	2.5	3.5	6.7
27	3.8	3.2	6.4	4.3	3.0	2.1	1.7	1.2	2.6	2.4	3.6	6.0
28	3.8	4.1	6.4	4.6	3.6	2.2	1.6	1.2	2.3	2.5	3.5	5.4
29	3.6	.....	6.6	4.3	3.3	2.2	1.6	1.1	2.6	6.6	3.4	5.7
30	3.3	.....	6.5	4.1	3.2	2.4	1.5	1.0	3.0	6.5	3.6	5.8
31	3.5	.....	6.0	.....	3.1	.....	1.5	1.0	.....	5.5	.....	5.8
1908.[b]												
1	5.7	2.5	3.8	7.1	5.3	3.5	1.5	1.7	0.9	2.3	3.1	1.9
2	5.2	3.1	3.5	6.7	6.6	3.3	1.4	1.5	.9	2.0	2.9	1.8
3	4.8	3.0	3.2	6.4	6.0	3.2	1.6	1.5	.9	1.7	2.7	1.8
4	4.4	5.0	3.4	5.7	5.9	3.0	1.5	1.3	.9	1.6	2.5	1.6
5	4.2	4.8	3.7	5.2	5.4	2.9	2.2	1.3	.9	1.6	2.3	1.6
6	3.8	4.7	3.5	4.9	4.9	2.7	2.0	1.2	.9	1.5	2.3	1.6
7	3.3	4.3	3.2	5.0	4.8	2.6	2.0	1.3	.8	1.5	2.3	1.7
8	3.5	3.9	3.2	5.0	8.1	2.6	1.9	1.3	.7	1.3	2.2	2.2
9	3.8	3.4	3.4	6.1	8.0	2.4	1.8	1.3	.7	1.2	2.2	2.2
10	3.9	3.2	3.2	7.3	7.2	2.3	1.7	1.3	.8	1.2	2.2	2.9
11	3.4	2.7	3.2	6.2	6.4	2.2	1.6	1.3	.8	1.2	2.1	2.4
12	3.4	2.7	3.3	5.6	5.7	2.4	1.5	1.3	.9	1.2	2.1	3.0
13	5.8	3.5	4.1	5.4	5.3	2.2	1.4	1.2	.8	1.3	2.2	2.2
14	6.5	4.8	6.5	5.0	4.9	2.1	1.4	1.2	.8	1.3	2.3	2.3
15	5.6	5.5	9.5	4.7	4.6	2.1	1.4	1.1	.7	1.3	2.3	2.4

[a] Ice conditions from about January 26 to March 14, 1907.
[b] Discharge probably affected by ice conditions from about January 30 to February 15, and about December 12 to 31, 1908.

Daily gage height, in feet, of Delaware River at Port Jervis, N. Y., for 1904–1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	5.0	13.5	8.8	5.0	5.2	2.3	1.4	1.1	0.7	1.3	2.1	2.6
17	4.6	8.5	7.8	5.3	4.5	2.4	1.4	1.1	.7	1.3	2.2	2.6
18	4.2	6.3	6.4	5.1	4.3	2.3	1.4	.9	.8	1.2	2.2	2.4
19	3.9	5.4	6.1	5.1	4.1	2.2	1.2	1.1	.7	1.2	2.1	2.2
20	3.9	4.8	7.0	5.2	3.8	2.1	1.3	1.1	.7	1.1	2.2	2.3
21	3.6	4.3	6.2	5.0	3.7	1.9	1.3	1.1	.7	1.1	2.2	2.4
22	3.5	4.2	5.6	4.7	4.2	1.8	1.3	1.1	.6	1.1	2.3	2.5
23	3.8	4.0	5.6	4.5	4.8	1.8	1.2	1.1	.6	1.1	2.2	2.6
24	3.6	3.6	6.1	4.3	5.6	1.7	1.2	1.0	.7	1.1	2.1	2.3
25	3.5	3.5	8.6	3.9	4.8	1.8	1.3	1.0	.7	1.1	2.1	2.3
26	2.9	3.4	7.2	3.7	4.2	1.7	3.4	1.0	.7	1.1	2.1	2.2
27	3.0	3.9	7.7	3.5	3.9	1.7	3.0	1.1	.7	2.1	2.1	2.2
28	3.6	4.4	9.1	4.2	3.6	1.7	2.5	1.1	.7	2.8	2.0	2.3
29	3.1	4.2	10.8	4.6	3.2	1.6	2.1	1.0	1.4	3.5	2.0	2.3
30	2.8	.....	10.1	4.5	3.0	1.6	1.8	1.0	2.0	4.4	2.0	2.2
31	2.5	.....	8.2	.....	3.8	.....	1.7	1.0	.....	3.7	.....	2.0

Rating table for Delaware River at Port Jervis, N. Y., for 1904–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.60	175	3.60	4,920	6.60	17,400	9.60	36,260
.70	225	3.70	5,210	6.70	17,940	9.70	36,960
.80	280	3.80	5,510	6.80	18,490	9.80	37,670
.90	340	3.90	5,820	6.90	19,040	9.90	38,380
1.00	400	4.00	6,140	7.00	19,600	10.00	39,100
1.10	465	4.10	6,470	7.10	20,170	10.10	39,820
1.20	540	4.20	6,810	7.20	20,740	10.20	40,540
1.30	625	4.30	7,160	7.30	21,320	10.30	41,270
1.40	720	4.40	7,520	7.40	21,900	10.40	42,000
1.50	820	4.50	7,880	7.50	22,490	10.50	42,730
1.60	930	4.60	8,250	7.60	23,090	10.60	43,460
1.70	1,050	4.70	8,630	7.70	23,700	10.70	44,200
1.80	1,170	4.80	9,020	7.80	24,310	10.80	44,940
1.90	1,300	4.90	9,420	7.90	24,930	10.90	45,680
2.00	1,440	5.00	9,830	8.00	25,560	11.00	46,420
2.10	1,590	5.10	10,250	8.10	26,190	11.10	47,170
2.20	1,750	5.20	10,670	8.20	26,820	11.20	47,920
2.30	1,920	5.30	11,100	8.30	27,460	11.30	48,670
2.40	2,100	5.40	11,540	8.40	28,100	11.40	49,420
2.50	2,290	5.50	11,980	8.50	28,750	11.50	50,170
2.60	2,480	5.60	12,430	8.60	29,410	11.60	50,930
2.70	2,680	5.70	12,890	8.70	30,070	11.70	51,690
2.80	2,890	5.80	13,360	8.80	30,740	11.80	52,450
2.90	3,110	5.90	13,840	8.90	31,420	11.90	53,210
3.00	3,340	6.00	14,320	9.00	32,100	12.00	53,970
3.10	3,580	6.10	14,810	9.10	32,780	13.00	61,720
3.20	3,830	6.20	15,310	9.20	33,470	13.50	65,660
3.30	4,090	6.30	15,820	9.30	34,160		
3.40	4,360	6.40	16,340	9.40	34,860		
3.50	4,640	6.50	16,870	9.50	35,560		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on 11 discharge measurements made during 1906 to 1908 and is well defined between gage heights 0.6 foot and 8 feet.

Monthly discharge of Delaware River at Port Jervis, N. Y., for 1904–1908.

[Drainage area, 3,250 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1904.						
October 13 to 31	44,200	2,680	8,660	2.66	1.88	B.
November	6,140	2,680	3,560	1.10	1.23	B.
December	22,500	.....	4,000	1.23	1.42	C.
1905.						
January	35,600	.....	8,380	2.58	2.97	C.
February	.....	.....	1,200	.369	.38	D.
March	50,900	.....	14,800	4.55	5.25	C.
April	25,600	4,090	9,300	2.86	3.19	B.
May	3,830	1,920	2,860	.880	1.01	B.
June	4,090	1,440	2,290	.705	.79	B.
July	4,090	930	1,440	.443	.51	B.
August	3,580	930	1,760	.542	.62	B.
September	13,400	1,440	5,820	1.79	2.00	B.
October	7,880	1,590	3,560	1.10	1.27	B.
November	14,300	1,750	2,950	.908	1.01	B.
December	41,300	3,110	8,140	2.50	2.88	B.
The year	50,900	.....	5,210	1.60	21.88	
1906.						
January	17,900	2,890	5,940	1.83	2.11	B.
February	15,300	.....	4,590	1.41	1.47	C.
March	34,200	2,680	8,780	2.70	3.11	B.
April	49,400	5,210	16,700	5.14	5.74	A.
May	12,400	2,480	4,960	1.53	1.76	B.
June	15,800	3,340	6,840	2.10	2.34	B.
July	6,470	1,750	3,280	1.01	1.16	A.
August	5,210	1,300	2,690	.828	.95	A.
September	2,480	1,170	1,680	.517	.58	A.
October	10,700	1,170	3,190	.982	1.13	A.
November	17,900	2,480	5,540	1.70	1.90	A.
December	9,830	2,680	4,880	1.50	1.73	A.
The year	49,400	.....	5,760	1.78	23.98	
1907.						
January	32,100	.....	9,920	3.05	3.52	B.
February	.....	.....	2,500	.769	.80	B.
March	31,400	.....	10,800	3.32	3.83	B.
April	11,500	4,090	6,430	1.98	2.21	A.
May	7,520	3,110	5,100	1.57	1.81	A.
June	5,820	1,590	3,260	1.00	1.12	A.
July	2,680	820	1,520	.468	.54	A.
August	820	400	595	.183	.21	A.
September	5,210	280	1,830	.563	.63	A.
October	17,400	2,100	5,210	1.60	1.84	A.
November	44,200	4,360	10,400	3.20	3.57	A.
December	62,500	2,890	12,200	3.75	4.32	A.
The year	62,500	280	5,810	1.79	24.40	
1908.						
January	16,900	2,290	6,620	2.04	2.35	A.
February	65,700	.....	7,920	2.44	2.63	B.
March	44,900	3,830	15,800	4.86	5.60	A.
April	21,300	4,640	10,800	3.32	3.70	A.
May	26,200	3,340	10,600	3.26	3.76	A.
June	4,640	930	1,990	.612	.68	A.
July	4,360	540	1,150	.354	.41	A.
August	820	340	531	.163	.19	A.
September	1,440	175	316	.097	.11	A.
October	7,520	465	1,290	.397	.46	A.
November	3,580	1,440	1,870	.575	.64	A.
December	3,110	930	1,500	.462	.53	B.
The year	65,700	175	5,030	1.55	21.06	

	Sec.-ft.
NOTE.—Discharge December 13 to 27, 104	2,520
January 24 to 31, 1905	2,800
March 1 to 18, 1905	1,200
February 10 to 22, 1906	1,400
January 26 to 31, 1907	4,500
March 1 to 14, 1907	2,000
February 1 to 15, 1908	2,980
December 12 to 31, 1908	1,520

Discharge during ice periods 1907 and 1908 estimated from Delaware River at Riegelsville, N. J., where there was no effect from ice.

DELAWARE RIVER AT RIEGELSVILLE, N. J.

This station, which is located at the toll suspension bridge between Riegelsville, N. J., and Riegelsville, Pa., was established July 3, 1906, to take the place of the station at Lambertville, N. J., where conditions of flow were unfavorable for obtaining accurate results.

The records of discharge at this point and at Lambertville furnish general statistical and comparative data, forming a basis for estimates of the total flow of the river to tide water, necessary for the solution of navigation problems, and, in conjunction with records obtained at other stations in the drainage area, being valuable in estimating the quantity of water flowing in the Delaware at any point, for canalization and power development.

Lehigh River enters the Delaware from the west about 9 miles above Riegelsville, and Musconetcong comes in from the east about 600 feet below the measuring section. The Musconetcong does not, however, materially affect the relation of gage height to discharge except at rare intervals.

The Delaware division of the Pennsylvania Canal, running from Easton, Pa., to Bristol, Pa., utilizes part of the total flow of the river at Riegelsville. It diverts water from the Lehigh at its mouth and at low stages takes practically the entire discharge of this tributary. The water is turned out of this canal during the winter period, or from about the middle of December to the last of March, but throughout the remainder of the year the discharge averages about 250 to 300 second-feet.

The datum of the chain gage has remained the same during the continuance of the station. The discharge is affected by ice only during severe winters. Conditions for obtaining accurate discharge data are very good, and an excellent rating curve has been developed. Comparisons of the records of flow with those at Port Jervis, N. Y., and Hancock, N. Y., show that full reliance can be placed in the estimates of monthly discharge at Riegelsville.

Discharge measurements of Delaware River at Riegelsville, N. J., in 1906–1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1906.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 3	Follansbee and Winter	492	4,440	4.52	8,550
1907.					
October 18	R. H. Bolster	473	4,200	4.14	6,630
1908.					
February 17 [a]	R. H. Bolster	517	10,800	17.10	80,600
Do	do	517	10,300	16.05	75,300
Do	do	517	9,820	15.20	66,600
February 18	do	517	7,740	11.15	38,900
Do	do	517	7,590	10.87	37,300
February 19	do	517	6,700	9.16	28,200
May 8	Henshaw and Barrows	516	8,730	13.10	51,600
May 9	do	517	9,180	13.93	56,700
May 13	A. T. Barrows	506	6,320	8.11	21,200
September 1	R. H. Bolster	407	3,200	1.99	1,490
September 15	K. C. Grant	444	3,080	1.75	1,120

[a] Float measurement.

Discharge measurements of Delaware division, Pennsylvania Canal, at Riegelsville, N. J., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.[a]	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 19	R. H. Bolster	34	206	4.00	246
1908.					
February 17 to 19					0
September 1	R. H. Bolster	34	208	2.00	294
September 15	K. C. Grant			1.75	290

[a] River gage.

Daily gage height, in feet, of Delaware River at Riegelsville, N. J., for 1907–8.

[John H. Deemer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	12.50	4.65	3.11	7.60	5.15	3.88	4.05	2.35	1.88	5.82	7.10	5.52
2	12.60	4.72	3.30	6.90	4.96	4.58	3.89	2.28	1.90	5.42	6.40	5.44
3	10.00	4.66	3.56	6.30	5.02	5.91	3.76	2.94	1.96	4.70	8.50	5.22
4	8.70	4.50	3.39	5.98	5.01	5.92	3.52	2.29	2.04	4.59	10.30	5.08
5	8.70	4.18	3.35	5.61	5.21	5.52	3.36	2.21	2.10	4.74	9.10	4.81
6	8.40	3.90	3.36	5.42	5.30	5.51	3.20	2.28	2.46	5.95	8.10	4.51
7	7.50	4.10	3.22	5.32	5.19	5.35	3.02	2.29	2.89	5.54	10.60	4.48
8	7.10	4.00	3.32	5.32	5.21	5.28	3.14	2.28	2.81	6.10	17.20	4.50
9	8.30	3.98	3.34	5.42	5.45	4.98	3.25	2.28	2.70	6.80	13.70	4.54
10	8.60	4.04	3.54	5.34	5.58	4.78	3.21	2.16	2.46	6.90	11.20	7.20
11	7.40	4.08	3.41	5.48	5.46	4.50	3.10	2.25	2.70	6.40	9.90	20.30
12	7.00	3.88	3.35	5.29	5.10	4.38	3.11	2.19	3.32	5.65	8.80	17.20
13	6.70	3.55	3.51	5.48	4.92	4.21	3.05	2.18	4.10	5.31	7.90	12.50
14	6.60	3.55	5.72	5.60	4.75	4.12	2.92	2.15	4.24	5.14	7.20	10.40
15	6.60	3.70	9.40	5.62	4.52	4.22	3.02	1.98	3.51	4.71	6.70	9.50
16	6.60	3.75	9.20	5.49	4.49	4.05	3.11	2.02	3.22	4.52	6.30	8.70
17	5.95	3.75	11.10	5.12	5.29	3.92	2.94	2.00	2.95	4.32	5.82	8.10
18	5.04	3.60	11.90	5.10	5.48	3.72	3.00	1.99	2.75	4.10	5.59	7.50
19	5.32	3.61	12.00	4.99	5.26	3.58	3.18	2.00	2.76	3.99	5.86	7.00
20	6.40	3.55	11.30	4.89	4.92	3.49	3.15	2.01	2.70	3.84	5.64	6.40
21	7.20	3.58	10.00	4.71	4.60	3.61	3.12	2.10	2.86	3.80	5.45	6.10
22	7.90	3.42	9.30	4.62	4.50	3.79	2.98	2.02	2.98	3.79	5.88	5.74
23	6.20	3.12	10.20	4.48	4.40	3.68	2.94	1.98	3.39	3.75	5.74	6.50
24	4.91	3.04	13.40	5.18	4.22	3.56	2.69	2.02	6.40	3.71	5.64	9.80
25	5.06	3.15	12.40	5.49	4.10	3.36	2.62	2.16	5.32	3.68	6.40	13.40
26	4.98	3.05	10.70	5.94	3.99	3.25	2.61	2.30	4.69	3.66	6.30	11.10
27	4.64	3.18	9.80	5.75	4.11	3.40	2.51	2.21	4.19	3.62	6.20	9.60
28	4.75	3.08	9.00	5.71	4.28	3.39	2.39	2.08	3.85	5.12	5.98	8.60
29	4.80	.....	9.00	5.72	4.52	3.21	2.39	2.02	5.91	7.20	5.82	8.20
30	4.84	.....	9.20	5.32	4.35	3.66	2.45	1.98	6.30	9.40	5.65	8.80
31	4.78	.....	8.50	.....	4.08	.....	2.32	1.99	.....	8.30	.....	8.70
1908.												
1	8.80	4.60	6.50	10.60	7.00	6.10	2.80	2.60	2.00	2.78	4.56	2.76
2	8.10	4.60	5.90	9.60	9.00	5.50	2.70	2.35	1.96	2.99	4.10	2.60
3	7.30	4.40	6.00	9.30	8.60	5.30	3.30	2.35	1.91	2.76	3.74	2.65
4	6.60	4.10	5.90	8.40	8.20	4.80	3.30	2.25	1.88	2.48	3.51	2.64
5	6.40	4.20	5.90	7.60	7.50	4.60	3.00	2.25	1.79	2.39	3.36	2.45
6	5.70	3.90	6.40	7.10	6.90	4.30	3.20	2.20	1.78	2.31	3.25	2.32
7	4.80	4.10	5.70	6.80	7.20	4.20	3.10	2.30	1.82	2.25	3.21	2.55
8	6.00	4.00	6.20	7.00	13.10	4.00	3.00	2.45	1.94	2.18	3.08	2.94
9	5.90	4.00	6.60	7.60	13.60	4.00	2.90	2.30	1.82	2.12	3.04	3.16
10	5.80	4.00	6.00	9.80	11.80	3.80	2.80	2.25	1.91	2.00	2.95	2.90
11	5.30	4.00	5.80	8.80	10.60	3.80	2.70	2.25	1.81	1.95	2.99	3.35
12	6.40	4.00	6.90	8.00	9.20	3.70	2.60	2.30	1.81	2.01	2.94	3.21
13	9.10	4.10	7.30	7.40	8.20	3.70	2.70	2.30	1.79	2.02	2.96	2.96
14	10.60	4.50	8.90	6.80	7.60	3.50	2.50	2.20	1.75	2.04	2.84	2.98
15	9.40	10.00	13.40	6.40	7.90	3.50	2.60	2.15	1.71	2.08	2.98	3.06
16	8.10	19.20	13.20	6.30	8.80	4.80	2.50	2.05	1.75	2.10	2.99	3.20
17	7.30	15.70	13.10	7.00	8.00	4.50	2.50	2.15	1.71	2.05	2.86	3.29
18	6.50	10.90	10.50	6.60	7.40	4.00	2.30	2.15	1.68	2.06	2.88	3.26
19	6.20	9.10	10.90	6.40	6.70	3.90	2.30	2.15	1.67	2.06	2.89	2.95
20	6.00	8.20	12.00	6.60	6.40	3.50	2.30	2.05	1.58	2.00	2.96	2.94
21	5.70	6.60	10.80	6.60	6.20	3.40	2.20	2.05	1.69	1.88	2.95	2.99
22	5.60	6.50	9.40	6.40	6.40	3.30	2.40	2.10	1.60	1.94	2.95	3.04
23	5.60	5.90	8.90	6.20	7.60	3.20	2.30	2.30	1.60	1.95	3.01	2.86
24	5.60	5.50	8.90	5.80	7.70	3.00	2.50	2.25	1.62	1.92	3.04	2.81
25	4.90	5.20	11.20	5.60	7.20	3.10	2.70	2.05	1.70	2.01	2.99	2.85
26	4.60	9.00	11.60	5.50	6.60	3.10	4.30	2.15	1.68	2.20	2.91	2.98
27	5.20	10.30	10.30	5.60	7.00	3.10	4.30	2.20	1.62	4.09	2.88	2.90
28	4.60	8.20	12.50	5.80	6.20	2.90	3.70	2.20	1.64	4.70	2.82	2.76
29	5.20	7.00	14.10	6.50	5.50	3.00	3.20	2.15	2.41	5.08	2.78	2.94
30	4.20	.....	15.10	6.30	5.50	2.80	2.90	2.00	2.86	5.48	2.72	2.79
31	3.60	.....	12.50	.....	6.30	.....	2.70	2.05	.....	5.40	.....	2.86

NOTE.—Discharge not materially affected by ice conditions 1907–8. No water flowing in the canal December 15, 1906, to April 7, 1907; December 13, 1907, to April 5, 1908; December 10, 1908, to March 18, 1909.

Rating table for Delaware River at Riegelsville, N. J., for 1906–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	810	3.10	3,750	4.70	8,490	7.60	19,740
1.60	930	3.20	4,000	4.80	8,820	7.80	20,660
1.70	1,060	3.30	4,260	4.90	9,160	8.00	21,600
1.80	1,200	3.40	4,530	5.00	9,500	9.00	26,600
1.90	1,350	3.50	4,800	5.20	10,190	10.00	32,130
2.00	1,500	3.60	5,080	5.40	10,890	11.00	38,080
2.10	1,660	3.70	5,360	5.60	11,610	12.00	44,400
2.20	1,830	3.80	5,650	5.80	12,350	13.00	51,100
2.30	2,010	3.90	5,950	6.00	13,100	14.00	58,100
2.40	2,200	4.00	6,250	6.20	13,860	15.00	65,300
2.50	2,400	4.10	6,560	6.40	14,640	16.00	72,600
2.60	2,600	4.20	6,870	6.60	15,440	17.00	80,050
2.70	2,810	4.30	7,190	6.80	16,260	18.00	87,650
2.80	3,030	4.40	7,510	7.00	17,100	19.00	95,350
2.90	3,260	4.50	7,830	7.20	17,960	20.00	103,150
3.00	3,500	4.60	8,160	7.40	18,840		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on 13 discharge measurements made during 1906–1908, and is well defined between gage heights 1.7 feet and 17 feet.

Monthly discharge of Delaware River at Riegelsville, N. J., for 1906–1908.

[Drainage area, 6,430 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1906.						
July	11,200	3,520	5,950	0.969	1.12	A.
August	8,850	2,600	4,980	.818	.94	A.
September	5,390	1,760	2,880	.491	.55	A.
October	14,700	2,240	5,500	.899	1.04	A.
November	20,300	4,560	8,450	1.36	1.52	A.
December	10,800	4,290	7,490	1.19	1.37	A.
1907.						
January	48,400	8,290	17,900	2.78	3.20	A.
February	8,560	3,600	5,610	.872	.91	A.
March	53,900	3,780	21,300	3.31	3.82	A.
April	19,700	7,770	11,300	1.79	2.00	A.
May	11,500	6,220	8,930	1.43	1.65	A.
June	12,800	4,030	6,670	1.08	1.20	A.
July	6,400	2,050	3,640	.610	.70	A.
August	3,360	1,470	1,780	.320	.37	A.
September	14,600	1,320	4,900	.806	.90	A.
October	28,800	5,140	10,500	1.68	1.94	A.
November	81,600	11,100	21,800	3.44	3.84	A.
December	105,000	7,770	25,400	3.97	4.58	A.
The year	105,000	1,320	11,600	1.84	25.11	
1908.						
January	35,700	5,080	14,800	2.30	2.65	A.
February	96,900	5,950	18,900	2.94	3.17	A.
March	66,000	12,000	30,200	4.70	5.42	A.
April	35,700	11,200	18,200	2.86	3.19	A.
May	55,300	11,200	22,200	3.50	4.04	A.
June	13,500	3,030	6,040	.983	1.10	A.
July	7,190	1,830	3,240	.547	.63	A.
August	2,600	1,500	1,860	.333	.38	A.
September	3,170	906	1,250	.238	.27	A.
October	11,200	1,320	3,040	.516	.59	A.
November	8,030	2,850	3,810	.636	.71	A.
December	4,400	2,050	3,290	.524	.60	A.
The year	96,900	906	10,600	1.67	22.75	

NOTE.—Conditions of flow were not affected by ice during 1906–1908. In order to obtain the discharge per square mile and run-off depth in inches, 280 second-feet were added July 1 to December 14, 1906; April 8 to December 12, 1907; April 6 to December 9, 1908, before computing the discharge per square mile. Hence the first three columns contain the actual discharge available in the river, while the remaining two represent the actual run-off from the drainage area above Riegelsville, including the discharge of the canal. (See description.)

DELAWARE RIVER AT LAMBERTVILLE, N. J.

This station, which was established July 22, 1897, was discontinued April 1, 1908. It was located at the toll bridge at Lambertville, N. J., and was maintained to obtain general statistical and comparative data regarding the total flow of the river. (See Delaware River at Riegelsville, N. J.) No important tributaries enter the Delaware for 20 miles above or below Lambertville.

The Delaware division of the Pennsylvania Canal, running from Easton, Pa., to Bristol, Pa., utilizes part of the total flow of the river at Lambertville on the western side. Little or no water flows in this canal during the winter period, but during the rest of the year the discharge probably averages about 250 to 300 second-feet.

The Delaware and Raritan Canal feeder takes out at Bull's Island, about 7 miles above Lambertville, N. J. As indicated by 13 measurements made by engineers of the United States Geological Survey, it utilizes about 356 to 535 second-feet, or an average of 468 second-feet of the total flow of the river at Lambertville on the easterly side throughout the entire year. This canal follows Delaware River to Trenton, N. J., and thence runs northeastward, following Millstone and Raritan rivers to New Brunswick, N. J.

The datum of the chain gage has remained unchanged during the maintenance of the station. In the winter months the discharge is usually affected by ice. Conditions for obtaining accurate discharge data are poor, because of several wing and movable dams about three-fourths of a mile below the bridge, which are changed and repaired frequently each year, and hence the gage height is not always a true index of the discharge.

Discharge measurements of Delaware River at Lambertville, N. J., 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 19	K. C. Grant	970	5,480	4.73	6,480
1908.					
February 16 [a]	R. H. Bolster	.....	14,100	13.60	112,000
Do. [b]	do	973	14,300	13.80	114,000
May 14	A. T. Barrows	944	6,420	6.24	18,900
September 1	G. C. Stevens	833	3,540	2.82	1,650

[a] Float measurement 100 yards above bridge.
[b] Float measurement at bridge. Passage of ice cakes under bridge timed with stop watch.

Daily gage height, in feet, of Delaware River at Lambertville, N. J., for 1907–8.

[Chas. N. Naylor, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	8.8	4.85	.....	6.45	4.85	4.0	4.7	2.4	2.5	5.85	6.45	5.4
2	9.45	4.65	.....	5.9	4.7	4.6	4.55	2.4	2.4	5.5	6.05	5.35
3	7.75	4.4	4.2	5.6	4.7	5.35	4.45	2.35	2.35	5.25	7.0	5.25
4	7.15	4.5	3.45	5.35	4.95	5.4	4.25	2.3	3.2	5.0	7.85	5.2
5	6.9	4.55	3.8	5.15	4.9	5.15	4.05	2.2	3.7	5.15	7.6	5.05
6	6.85	.....	3.8	5.0	4.95	5.0	3.9	2.3	4.1	5.4	6.95	4.9
7	6.35	.....	3.6	4.95	4.9	5.0	3.6	2.3	4.0	5.6	8.2	4.8
8	6.1	.....	3.7	5.0	4.85	4.95	3.6	2.3	4.2	5.95	11.9	4.8
9	6.45	.....	3.65	5.15	4.9	4.8	3.7	2.45	4.0	6.3	10.15	4.8
10	6.95	.....	3.8	5.1	5.05	4.6	3.85	2.3	3.9	6.1	8.65	5.75
11	6.35	.....	3.75	5.05	5.2	4.45	3.8	2.45	3.8	6.05	7.85	13.1
12	6.2	.....	3.7	5.0	4.9	4.36	3.65	2.1	4.45	5.65	7.2	12.6
13	6.2	.....	3.85	5.0	4.75	4.2	3.65	2.15	4.75	5.4	6.65	9.6
14	6.15	.....	5.5	5.15	4.6	4.15	3.5	2.05	4.9	5.2	6.3	8.1
15	6.0	.....	8.1	5.25	4.4	4.1	3.55	1.9	4.8	5.25	6.05	7.7
16	5.9	.....	7.6	5.1	4.65	4.1	3.65	2.05	4.5	5.0	5.75	7.0
17	5.7	.....	8.55	4.9	5.0	4.0	3.4	1.9	4.3	4.95	5.55	6.8
18	5.2	.....	8.95	4.85	5.0	3.85	3.35	1.95	4.1	4.8	5.4	6.4
19	5.1	5.6	8.8	4.75	5.0	3.75	3.45	1.95	3.95	4.55	5.75	6.1
20	5.7	5.65	8.9	4.7	4.8	3.6	4.0	1.9	4.05	4.6	5.55	5.9
21	6.25	.....	7.9	4.6	4.4	3.6	3.8	2.4	4.05	4.6	5.4	5.65
22	6.9	.....	7.2	4.55	4.35	3.75	3.4	2.65	4.3	4.6	5.5	5.4
23	6.0	.....	7.4	4.4	4.3	3.85	3.35	2.7	4.7	4.55	5.5	6.35
24	5.2	.....	9.2	5.1	4.2	3.8	3.2	2.85	6.55	4.5	5.85	7.7
25	5.0	.....	9.15	5.1	4.15	3.7	2.95	3.3	5.8	4.5	6.2	9.75
26	5.0	.....	8.1	5.2	4.1	3.7	2.85	3.5	5.2	4.5	5.95	8.55
27	4.95	.....	7.4	5.25	4.1	3.7	2.7	3.35	4.95	4.5	5.8	7.5
28	4.75	.....	7.0	5.2	4.1	4.0	2.7	3.15	4.6	6.05	5.7	7.0
29	4.7	.....	6.9	5.2	4.35	3.85	2.5	2.75	7.1	6.85	5.55	6.7
30	4.8	.....	7.2	5.05	4.35	4.15	2.5	2.6	6.3	7.8	5.45	7.0
31	5.0	.....	6.85	.....	4.15	.....	2.35	2.5	.....	7.15	.....	7.1

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1908.[b]				1908.[b]				1908.[b]			
1	7.1	5.4	5.75	11	5.5	.....	5.2	21	5.45	6.2	8.2
2	6.85	.....	5.4	12	6.0	.....	5.7	22	5.3	5.9	7.3
3	6.3	.....	5.4	13	7.4	.....	6.0	23	5.3	5.6	6.9
4	5.9	4.8	5.4	14	8.0	.....	6.7	24	5.35	5.25	6.9
5	5.8	.....	5.3	15	7.45	8.7	9.4	25	5.05	5.05	7.5
6	5.9	.....	5.4	16	6.75	13.0	9.4	26	4.9	7.0	8.45
7	5.4	.....	5.35	17	6.4	11.5	9.45	27	5.05	8.7	7.75
8	5.9	.....	5.75	18	6.05	8.4	8.2	28	4.95	6.75	8.45
9	5.75	.....	5.9	19	5.75	7.05	8.45	29	5.2	6.05	9.7
10	5.4	.....	5.65	20	5.55	6.95	8.85	30	5.0	.....	10.5
								31	4.7	.....	9.35

[a] Ice conditions about February 6 to March 2, 1907. August 20, 1907, dam put in at canal-boat ferry one-half mile below bridge. September 3, 1907, closed channel in dam at ferry.
[b] Ice conditions February 2 to 15, 1908.

WEST BRANCH OF DELAWARE RIVER AT HANCOCK, N. Y.

This station is located at the toll suspension bridge, one-half mile west of the Erie Railroad station at Hancock, N. Y., and about 1 mile above the junction of East and West branches of Delaware River. It was established October 15, 1902, and has since been maintained in cooperation with the New York State engineer department and during the past year with the United States Weather Bureau.

The station was established to obtain general statistical and comparative data regarding the flow of the Delaware River for power and navigation purposes.

Oquaga Creek, which drains the eastern portion of Broome County, is the nearest important tributary to West Branch of Delaware River. It enters from the right, about 10 miles upstream from the gaging station.

The datum of the chain gage has remained the same since the establishment of the station. Conditions for accurate ratings can not be considered good. The high-water stage is probably affected by backwater from East Branch of Delaware River. The low-water stage is controlled by rifts about 800 feet below the station, but frequent changes in conditions of flow require many measurements and new ratings each year. During the winter months the discharge is affected considerably by ice conditions.

Information in regard to this station is contained in the annual reports of state water-supply commission of New York and of the state engineer and surveyor, State of New York.

Discharge measurements of West Branch of Delaware River at Hancock, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 21	Wood and Hoyt	200	389	3.29	397
1908.					
September 3	C. R. Adams	185	188	2.38	40.0
September 4	do	185	185	2.42	29.5
September 26 [a]	do	60	28.3	2.39	45.6
October 23	Wood and French	180	236	2.59	86.3

[a] Wading measurement.

Daily gage height, in feet, of West Branch of Delaware River at Hancock, N. Y., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	6.55	4.0	3.9	4.95	5.1	3.45	3.5	2.6	2.3	3.8	4.1	3.5
2	5.4	4.0	4.05	4.6	4.9	3.5	3.4	2.7	2.3	3.6	4.5	3.5
3	4.95	3.9	4.15	4.45	4.65	3.55	3.3	2.7	2.4	3.4	5.9	3.5
4	5.9	3.9	4.2	4.3	4.55	3.55	3.1	2.9	2.8	4.0	5.5	3.3
5	5.65	4.0	4.25	4.2	4.65	3.45	3.1	3.0	3.7	5.7	5.1	3.3
6	5.05	4.05	4.2	4.1	4.4	3.7	3.0	2.8	3.6	5.0	4.8	3.2
7	5.0	4.4	4.1	3.9	4.4	3.85	3.3	2.8	3.1	4.5	7.6	4.2
8	5.4	4.55	4.0	3.9	4.85	3.85	3.1	2.8	3.0	4.5	7.8	5.1
9	5.4	4.5	3.9	4.15	4.65	3.7	3.0	2.7	3.1	5.5	6.4	4.3
10	4.7	4.5	4.0	4.1	4.55	3.55	2.8	2.6	3.6	4.8	5.7	6.4
11	4.75	4.35	3.95	4.05	4.35	3.5	2.8	2.6	4.0	4.5	5.3	10.0
12	4.6	4.25	3.8	4.15	4.25	3.45	3.0	2.4	4.9	4.5	4.9	7.1
13	4.4	4.25	3.85	4.3	4.2	3.45	3.5	2.5	4.4	4.3	4.5	6.0
14	4.45	4.55	4.2	4.4	4.1	3.3	3.1	2.4	3.9	4.1	4.5	5.3
15	4.6	4.5	7.85	4.25	3.92	3.25	3.1	2.4	3.6	4.0	4.3	5.3
16	4.15	4.3	5.35	4.2	3.9	3.2	3.1	2.4	3.4	3.8	4.1	5.0
17	3.9	4.0	5.75	4.2	4.05	3.2	2.8	2.3	3.2	3.7	4.0	4.8
18	3.65	4.05	5.6	4.15	4.0	3.1	3.0	2.5	3.0	3.5	3.8	4.5
19	4.45	4.0	5.6	4.0	3.9	3.1	3.0	2.3	3.1	3.5	3.8	4.4
20	5.15	4.1	4.9	4.0	3.95	3.25	3.1	2.3	3.0	3.3	3.8	4.0
21	4.9	4.0	4.55	3.9	3.8	3.25	2.8	2.4	3.0	3.6	3.8	4.2
22	4.25	3.9	5.1	3.85	3.75	3.15	2.9	2.4	3.1	3.6	3.8	3.8
23	3.5	4.05	6.7	3.9	3.65	3.0	2.9	2.3	3.2	3.5	3.7	4.1
24	3.55	4.2	6.75	4.4	3.6	3.05	2.9	2.4	3.6	3.5	3.6	8.6
25	3.55	4.35	6.25	4.75	3.55	3.0	2.8	2.4	3.5	3.3	3.8	6.9
26	4.2	4.05	5.8	4.7	3.55	2.95	3.0	2.3	3.3	3.2	3.7	5.9
27	4.5	3.9	5.5	5.35	3.75	3.2	2.9	2.3	3.1	3.1	3.8	5.4
28	4.3	3.9	5.75	5.0	3.85	3.3	2.8	2.4	3.2	4.2	3.6	5.8
29	4.3	.....	6.00	4.85	3.55	3.15	3.0	2.3	3.4	6.3	3.4	5.8
30	4.25	.....	5.65	4.7	3.5	3.25	2.5	2.2	3.9	5.7	3.7	5.2
31	3.95	.....	5.25	.....	3.4	.....	2.6	2.2	.....	5.1	.....	5.4
1908.[b]												
1	5.1	4.2	7.1	5.9	5.1	3.7	2.7	2.9	2.4	3.0	3.4	3.1
2	4.9	5.1	7.6	5.6	5.5	3.6	2.6	2.6	2.4	2.9	3.2	2.9
3	4.5	5.2	7.7	6.0	5.7	3.4	2.4	2.6	2.3	2.7	3.1	3.6
4	4.2	5.0	4.2	5.9	5.5	3.3	3.4	2.5	2.3	2.5	3.1	2.7
5	4.3	5.1	4.0	4.4	5.0	3.1	3.2	2.7	2.3	2.9	3.0	3.2
6	3.5	5.2	3.9	4.7	4.9	3.2	3.1	2.6	2.3	2.7	3.1	3.0
7	3.6	5.0	3.8	4.7	4.8	3.1	3.0	2.6	2.4	2.6	3.1	3.2
8	3.9	5.1	3.9	4.7	7.1	3.2	2.9	2.7	2.3	2.6	3.1	3.7
9	4.0	5.0	3.7	6.7	6.6	3.2	2.9	2.7	2.4	2.6	3.1	4.5
10	3.9	4.9	3.9	6.0	6.2	3.0	2.9	2.6	2.5	2.7	3.0	3.8
11	6.6	4.7	3.5	5.6	5.8	3.1	2.9	2.6	2.5	2.8	3.1	3.8
12	5.0	4.8	3.8	5.3	5.4	3.1	2.8	2.6	2.5	2.4	3.1	4.5
13	5.7	4.8	5.4	5.0	5.1	3.1	2.7	2.5	2.5	2.5	3.4	4.5
14	5.3	4.7	8.6	4.9	4.8	3.1	2.7	2.6	2.5	2.6	3.2	4.6
15	4.5	6.4	7.2	4.5	5.0	3.0	2.6	2.5	2.4	2.7	3.0	4.7
16	4.5	10.4	7.7	5.4	4.9	3.0	2.7	2.7	2.4	2.7	3.0	4.5
17	4.1	6.4	6.0	5.0	4.6	3.1	2.7	2.6	2.3	2.7	3.1	4.4
18	3.9	5.1	5.2	4.8	4.4	3.1	2.7	2.7	2.3	2.6	3.0	4.2
19	3.9	4.6	5.3	5.1	4.2	2.8	2.7	2.7	2.3	2.3	3.1	4.2
20	3.9	4.0	5.1	5.0	3.9	2.8	2.7	2.5	2.3	2.5	3.0	4.4
21	3.5	3.6	4.4	5.0	4.1	2.9	2.6	2.4	2.3	2.4	3.1	4.5
22	3.9	4.1	4.5	4.8	4.1	2.8	2.7	2.4	2.3	2.4	3.1	4.3
23	3.8	3.8	4.6	4.7	4.2	2.7	2.6	2.6	2.3	2.4	3.0	4.1
24	3.5	3.5	6.0	4.6	4.3	2.7	2.6	2.5	2.3	2.5	3.2	4.1
25	3.2	3.8	6.6	4.3	4.0	2.7	3.0	2.5	2.3	2.5	3.0	4.3
26	3.4	3.5	5.7	4.3	3.9	2.7	3.4	2.5	2.3	2.4	3.2	4.5
27	3.9	4.3	6.7	4.3	3.9	2.7	3.2	2.4	2.3	3.1	3.1	4.3
28	3.9	4.0	7.5	4.5	3.8	2.8	3.1	2.4	2.3	2.8	3.1	4.3
29	3.9	5.4	8.4	4.5	3.7	2.6	2.9	2.4	3.0	3.8	3.1	4.1
30	3.8	.....	7.4	4.2	3.5	2.5	2.8	2.4	3.1	4.0	3.0	3.9
31	3.7	.....	6.4	.....	3.9	.....	2.7	2.4	.....	3.7	.....	4.3

[a] Ice conditions prevailed from about January 26 to March 15 and December 7 to 10, 1907.
[b] Ice conditions January 11, February 1 to 15, February 29 to March 3, December 3, and December 5 to 31, 1908.

Rating tables for West Branch of Delaware River at Hancock, N. Y.

1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.20	25	3.60	615	5.00	2,470	6.80	6,920
2.30	41	3.70	700	5.10	2,650	7.00	7,510
2.40	60	3.80	790	5.20	2,840	7.20	8,120
2.50	83	3.90	890	5.30	3,040	7.40	8,740
2.60	110	4.00	1,000	5.40	3,250	7.60	9,380
2.70	140	4.10	1,120	5.50	3,470	7.80	10,020
2.80	175	4.20	1,250	5.60	3,700	8.00	10,680
2.90	210	4.30	1,380	5.70	3,940	8.20	11,340
3.00	250	4.40	1,520	5.80	4,190	8.40	12,010
3.10	295	4.50	1,660	5.90	4,440	8.60	12,700
3.20	345	4.60	1,810	6.00	4,700	8.80	13,410
3.30	405	4.70	1,970	6.20	5,230	9.00	14,140
3.40	470	4.80	2,130	6.40	5,780	10.00	18,100
3.50	540	4.90	2,300	6.60	6,340		

NOTE.—This table is not applicable for ice or obstructed-channel conditions. It is based on 1 discharge measurement made during 1907, the form of the 1908 rating curve, and intercomparisons of minimum discharge with Delaware River at Port Jervis, N. Y., and adjoining drainages. It is well defined between gage heights 3.5 feet and 9 feet. It has been revised, and differs slightly from that published in the report of the state engineer and surveyor, State of New York.

1908.

2.30	28	2.80	150	3.30	383	3.80	785
2.40	43	2.90	187	3.40	450	3.90	890
2.50	63	3.00	228	3.50	526	4.00	1,000
2.60	88	3.10	273	3.60	605		
2.70	117	3.20	324	3.70	690		

NOTE.—This table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1902–1908 and is well defined below gage height 9 feet. Above gage height 4 feet the table is the same as that for 1907.

Monthly discharge of West Branch of Delaware River at Hancock, N. Y., for 1907–8.

[Drainage area, 680 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.[a]						
January	6,200	.....	1,840	2.71	3.12	B.
February	.....	.....	300	.441	.46	D.
March	7,500	.....	2,390	3.51	4.05	B.
April	3,140	840	1,460	2.15	2.40	B.
May	2,650	470	1,200	1.76	2.03	B.
June	840	230	450	.662	.74	B.
July	540	83	266	.391	.45	B.
August	250	25	88.3	.130	.15	C.
September	2,300	41	516	.759	.85	B.
October	5,500	295	1,440	2.12	2.44	B.
November	10,000	470	2,200	3.24	3.62	B.
December	18,100	345	3,120	4.59	5.29	B.
The year	18,100	25	1,270	1.87	25.60	
1908.[b]						
January	3,940	324	1,230	1.81	2.09	B.
February	19,800	.....	1,580	2.32	2.50	B.
March	12,700	526	3,870	5.69	6.56	A.
April	6,630	1,250	2,640	3.88	4.33	B.
May	7,810	526	2,350	3.46	3.99	B.
June	690	63	250	.368	.41	B.
July	450	43	175	.257	.30	B.
August	187	43	81	.119	.14	B.
September	273	28	51.7	.076	.08	B.
October	1,000	28	173	.254	.29	B.
November	450	228	278	.409	.46	B.
December	.....	.....	250	.368	.42	D.
The year	19,800	28	1,080	1.58	21.57	

[a] Discharge during the period of ice conditions, 1907, estimated on the basis of the discharge of Delaware River at Port Jervis, N. Y., and the East Branch of Delaware River at Hancock (see rating-table footnote):

	Second-feet.
Discharge January 26 to 31, 1907	400
March 1 to 14, 1907	250
March 15, 1907	7,500
December 7 to 10, 1907	825

[b] Discharge during the periods of ice conditions, 1908, estimated on the basis of the discharge at Port Jervis, and the East Branch of Delaware River at Hancock:

	Second-feet.
Discharge January 11	800
February 1 to 15	480
February 29	800
March 1 to 3	1,000
December 3	200
December 5 to 31	258

PAULINS KILL AT COLUMBIA, N. J.

Paulins Kill rises on the east slope of Kittatinny Mountain, in central Sussex County, N. J., and flows southwestward into the Delaware at Columbia. Its length is about 36 miles. Its total drainage area comprises about 180 square miles, of which 25 per cent is in forest. For the first 10 miles from the mouth the fall averages 7 feet per mile, with little variation; for 20 miles above this it is 8.5 feet per mile, also very uniform. The bottom of the valley is blue limestone; the higher portions are mainly slate. Lakes on the watershed, including Swartswood and Culvers, have been utilized as reservoirs for mills. The mean annual rainfall is about 45 inches.

The gaging station was established August 1, 1908, by Messrs. Meikleham and Dinsmore, through whose courtesy the records of discharge given in the following table are published. List of discharge measurements and description of location of station are not yet available. The rating curve is fairly well defined by five discharge measurements.

Daily gage height, in feet, and daily discharge, in second-feet, of Paulins Kill at Columbia, N. J., for 1908.

Day	August.		September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1	0.93	85	0.93	85	1.03	106	1.24	160	0.82	64
2	.98	100	.93	85	1.28	169	1.10	123	.84	66
3	.86	72	.92	84	1.29	170	.91	83	.74	53
4	.98	100	.91	83	1.20	150	1.11	125	.72	50
5	.93	85	.95	92	1.08	120	.96	93	.76	57
6	.90	82	1.00	103	1.05	113	.89	80	.75	55
7	.91	83	1.02	105	1.02	105	1.10	123	.94	90
8	1.08	120	1.01	104	1.08	120	.89	80	1.02	105
9	1.00	103	1.02	105	1.13	130	.89	80	1.00	103
10	.93	85	.96	93	1.18	146	.90	82	1.10	123
11	.96	93	1.00	103	1.14	135	.84	70	1.29	170
12	.97	94	.90	82	1.16	140	.95	92	1.31	178
13	.97	94	.91	83	1.16	140	.90	82	.90	82
14	.98	100	.90	82	1.16	140	.88	78	1.30	176
15	.96	93	.91	83	1.16	140	.89	80	.85	72
16	.97	94	.92	84	1.15	138	.88	78	.86	73
17	.95	92	.97	94	1.14	135	.94	90	.88	78
18	.91	83	.95	92	1.10	123	.93	85	.98	100
19	.97	94	.97	94	1.06	114	.94	90	.89	80
20	.98	100	.95	92	1.04	109	.95	92	.91	83
21	.97	94	.90	82	1.02	105	.98	100	.93	85
22	1.00	103	.97	94	1.10	123	1.01	103	.95	92
23	1.13	130	.96	93	1.13	130	1.00	100	.92	84
24	1.05	113	1.02	105	1.13	130	.90	82	.99	101
25	1.04	111	.93	85	1.10	123	.90	82	.98	100
26	1.08	120	.94	90	1.13	130	.86	73	.99	101
27	1.05	113	.92	84	2.23	500	.95	92	.92	84
28	1.02	105	.91	83	1.67	285	.85	72	.99	101
29	1.05	113	1.23	157	1.67	285	.98	100	1.00	103
30	1.09	122	1.18	146	1.62	270	.97	94	1.13	130
31	.95	92	.....	.....	1.59	260	.....	.....	1.15	138

Monthly discharge of Paulins Kill at Columbia, N. J., for 1908.

[Drainage area, 179 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
August	130	72	99.0	0.553	0.64
September	157	82	94.9	.530	.59
October	500	105	161	.899	1.04
November	160	70	92.1	.515	.57
December	178	50	96.0	.536	.62

MUSCONETCONG RIVER NEAR BLOOMSBURY, N. J.

Musconetcong River rises in Lake Hopatcong, in the southeastern part of Sussex County, N. J., and flows southwestward, uniting with Delaware River near Riegelsville. Its length is about 45 miles, and its drainage area, measured at the mouth, is about 160 square miles, of which about 40 per cent is forested. The rainfall in this portion of New Jersey is about 48 inches per annum. For 38 miles of its course the stream flows at the southeast side of a very straight valley, above which the hills rise from 400 to 500 feet. The fall of the river is very large, averaging 15 feet or more per mile. The bed is of gravel and rock, and the facilities for the utilization of power are excellent. The tributaries, except at the headwaters, are small and unimportant.

Both on the main stream and its principal tributary, Lubbers Run, considerable storage has been used by the Morris Canal to feed that waterway. The canal, which extends from Phillipsburg, N. J., to Jersey City, and parallels the Musconetcong within 2 miles through a considerable portion of its course, crosses the river just below Lake Hopatcong, utilizing the reservoir at Stanhope and portions of the river below.

The gaging station, which was established July 4, 1903, was discontinued April 1, 1907. It was located at the first highway bridge about 2 miles above Bloomsbury, N. J., and about 10 miles above the mouth of the river.

The datum of the chain and staff gages remained unchanged during the maintenance of the station. The discharge is affected by ice during the winter period. Conditions of flow have been nearly permanent, and a good rating curve has been developed for low and medium stages.

Daily gage height, in feet, of Musconetcong River near Bloomsbury, N. J., for 1907.

[Michael Kieffer, observer.]

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	2.38	1.50	1.25	11	1.58	1.72	1.32	21	1.98	1.32	2.62
2	2.08	1.45	1.38	12	1.80	1.68	1.30	22	1.85	1.25	2.50
3	1.90	1.50	1.42	13	1.75	1.80	1.50	23	1.68	1.38	2.50
4	1.95	1.48	1.42	14	1.90	1.75	3.20	24	1.65	1.32	2.48
5	1.90	1.28	1.38	15	1.85	1.70	3.30	25	1.65	1.30	2.52
6	1.80	1.45	1.32	16	1.78	1.68	2.92	26	1.62	1.38	2.32
7	1.72	1.52	1.30	17	1.58	1.62	3.02	27	1.58	1.30	2.20
8	1.75	1.60	1.30	18	1.62	1.55	3.08	28	1.65	1.25	2.12
9	1.72	1.85	1.32	19	1.90	1.45	2.90	29	1.62	.....	2.08
10	1.65	1.78	1.35	20	2.00	1.38	2.92	30	1.55	.....	1.95
								31	1.52	.....	1.75

NOTE.—It is probable that the discharge was not greatly affected by ice conditions during January and March. The greater part of February was probably affected by ice.

Rating table for Musconetcong River near Bloomsbury, N. J., for 1903–1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.20	107	1.80	283	2.40	499	2.90	698
1.30	132	1.90	317	2.50	538	3.00	739
1.40	160	2.00	352	2.60	578	3.10	780
1.50	190	2.10	388	2.70	618	3.20	821
1.60	220	2.20	424	2.80	658	3.30	862
1.70	251	2.30	461				

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on 9 discharge measurements made during 1903–1906, and is well defined between gage heights 1 foot and 3 feet.

Monthly discharge of Musconetcong River near Bloomsbury, N. J., for 1907.

[Drainage area, 146 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	491	196	277	1.90	2.19	C.
February	.....	.....	100	.685	.71	D.
March	862	120	394	2.70	3.11	C.

NOTE.—The values for January and March may be somewhat in excess due to ice conditions. The discharge for February was estimated.

TOHICKON CREEK AT POINT PLEASANT, PA.

Tohickon Creek rises in the western part of Bucks County, Pa., and flows eastward into the Delaware at Point Pleasant. Its drainage area comprises about 102 square miles, the greater part being farm land under a high degree of cultivation, the original forest cover having been almost entirely cut away. The stream is subject to very sudden freshets, and during heavy rains large quantities of surface soil are eroded.

The gaging station is located about one-eighth mile above the mouth of the creek, and the records show the discharge of practically the entire drainage area. The fall of the stream from its source to the gaging station is about 600 feet in 28 miles. Continuous records of flow have been obtained each year since 1883, with the exception of 1900, by the Philadelphia bureau of water, department of public works, under the personal supervision of John E. Codman, by whom the following data have been furnished.

An automatic gage is used to obtain a continuous record of gage height. The lower part of the rating curve has been developed from the computed discharge over a weir, and the discharge at high stages is determined from a curve developed from current-meter measurements. The rating curve is well defined.

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pa., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2,074.0	273.0	26.1	54.2	62.1	25.7	141.0	7.7	6.4	232.0	79.1	86.7
2	496.5	404.0	29.8	49.6	68.7	1,040.7	82.2	5.1	5.0	107.0	331.8	78.5
3	288.0	404.0	646.0	48.7	56.6	454.3	164.5	3.8	5.0	71.8	1,349.6	70.8
4	683.5	404.0	859.5	41.6	249.2	197.5	82.5	3.1	4.6	65.8	319.2	60.6
5	566.0	294.0	858.5	34.6	207.0	188.0	44.3	5.7	35.0	74.7	353.5	75.5
6	209.0	184.0	692.5	34.6	95.5	102.5	28.7	6.4	38.0	66.3	385.5	82.0
7	105.5	184.0	542.5	34.6	67.0	70.0	22.1	5.4	20.6	50.5	1,760.0	74.7
8	108.5	184.0	475.0	116.6	63.6	46.0	17.2	5.9	8.4	1,385.8	650.0	71.4
9	293.3	151.0	536.0	236.5	95.5	39.0	16.9	14.5	10.7	481.5	215.0	69.2
10	119.0	107.5	652.5	245.0	100.0	37.2	17.2	16.0	12.9	188.0	475.0	1,706.0
11	92.7	84.0	659.0	113.5	90.5	33.0	24.0	6.3	19.8	106.0	528.0	1,692.0
12	748.7	71.0	554.5	79.0	89.0	29.8	30.6	7.9	109.0	84.7	210.5	533.0
13	782.0	71.0	731.7	64.6	64.6	26.0	27.9	8.2	86.0	69.6	120.5	136.0
14	855.0	71.0	2,281.0	58.1	53.4	26.8	21.4	3.9	32.0	55.5	87.5	176.0
15	840.0	71.0	2,975.0	54.4	48.7	30.6	20.3	5.2	17.6	44.7	70.4	816.5
16	337.5	71.0	2,710.5	46.3	154.1	23.7	17.6	7.3	10.6	35.2	61.8	950.5
17	105.5	71.0	1,732.0	41.5	552.5	25.7	10.6	6.4	12.9	35.2	55.4	488.2
18	106.5	71.0	1,436.0	43.0	194.0	27.2	12.9	4.3	10.9	36.8	71.5	226.0
19	148.0	71.0	736.5	44.0	92.5	21.4	14.5	2.9	10.9	35.8	717.5	125.5
20	679.5	79.0	1,469.0	44.8	74.0	23.1	65.1	3.6	14.6	30.0	320.5	104.0
21	729.5	97.0	744.0	47.8	62.2	77.0	94.5	5.0	18.1	23.1	277.5	97.0
22	193.0	97.0	445.5	38.8	48.7	73.3	50.8	6.4	18.3	23.1	445.0	79.0
23	131.0	87.0	351.5	37.3	45.5	73.3	25.2	6.4	1,530.4	23.1	279.0	2,552.8
24	131.0	72.5	258.0	1,419.5	40.5	73.9	18.3	5.9	2,902.0	23.1	859.4	1,490.5
25	124.5	53.3	125.5	431.0	35.0	13.6	12.5	14.9	532.0	23.1	1,514.3	291.5
26	118.0	39.6	120.0	130.5	31.8	13.6	8.6	26.8	161.5	23.1	920.0	195.0
27	118.0	30.6	92.7	92.7	37.3	15.7	9.0	26.8	69.0	23.1	388.5	140.0
28	129.5	26.8	82.7	68.3	39.7	15.7	6.3	17.6	673.8	2,640.4	217.5	116.5
29	131.0	.....	79.0	58.0	33.0	18.3	5.7	10.6	4,118.0	1,858.1	146.5	102.0
30	131.0	.....	64.5	53.3	28.7	136.0	8.9	7.0	1,027.0	659.5	106.5	267.0
31	136.5	.....	58.1	.....	21.8	.....	9.7	6.4	.....	190.5	.....	515.0
1908.												
1	186.5	747.5	104.0	102.0	171.3	113.9	10.0	11.0	13.4	14.3	25.8	12.6
2	107.5	413.0	74.7	139.0	103.7	51.9	8.7	6.3	8.0	9.6	21.3	12.2
3	92.0	157.5	79.7	128.0	54.2	40.5	10.9	7.0	6.3	9.5	19.7	10.6
4	97.0	101.7	82.7	79.0	41.0	35.6	10.1	9.0	5.3	5.5	16.9	9.7
5	107.0	64.0	70.7	57.5	39.5	29.5	10.1	5.9	6.9	12.0	18.6	11.3
6	107.0	55.6	58.5	44.0	39.5	22.5	16.0	8.4	5.9	12.4	17.5	8.6
7	712.5	54.4	359.0	44.5	1,382.1	14.0	14.4	12.1	5.9	5.9	15.7	182.5
8	748.0	53.1	596.5	76.0	1,381.0	18.8	9.0	9.7	6.8	6.8	12.3	205.0
9	261.5	53.1	877.2	171.2	648.5	21.0	7.5	6.8	5.9	7.3	7.8	72.5
10	109.0	53.1	345.0	94.5	348.5	13.3	5.9	8.4	5.5	6.2	8.6	53.4
11	97.0	48.5	186.0	74.0	204.0	10.6	7.5	9.5	7.5	4.4	8.2	41.6
12	1,233.9	44.0	186.0	61.0	104.7	10.6	6.3	6.4	6.8	5.5	7.0	56.5
13	1,696.0	44.0	218.0	45.0	68.3	13.4	4.3	6.3	3.7	10.3	7.5	71.4
14	439.0	515.0	218.0	46.4	61.0	9.9	7.0	7.2	3.4	3.6	5.5	58.7
15	189.0	2,772.6	391.5	48.2	1,074.5	15.3	7.3	6.3	2.8	2.2	5.0	41.4
16	136.5	1,868.0	421.0	150.6	1,011.0	162.5	7.3	4.8	4.9	3.9	11.0	30.2
17	104.7	308.5	204.0	62.2	302.0	138.0	6.4	6.3	5.5	4.2	11.8	30.6
18	82.7	102.2	715.2	47.3	309.0	45.1	4.6	8.9	3.1	3.9	7.6	39.6
19	79.0	562.5	2,259.2	51.3	104.0	33.4	5.7	5.2	3.9	4.1	8.7	59.8
20	71.0	802.0	638.7	61.0	162.5	26.4	5.7	4.7	4.4	8.5	14.7	62.6
21	64.6	464.0	233.5	61.8	179.0	15.1	5.5	4.7	2.6	3.1	21.7	64.3
22	58.1	212.5	143.5	52.1	337.2	14.6	5.7	3.2	2.0	3.3	23.1	54.1
23	58.1	112.5	186.5	42.8	223.0	20.0	8.2	2.8	2.7	4.2	23.1	48.5
24	58.1	102.5	326.2	37.0	162.5	17.6	6.7	2.7	3.8	4.7	21.4	53.1
25	58.1	97.0	220.0	38.0	87.5	14.6	16.8	3.1	2.3	4.0	21.5	53.1
26	58.1	2,262.0	119.5	32.9	58.3	15.7	159.5	34.0	2.1	50.8	21.5	41.8
27	118.0	1,156.4	92.0	30.7	46.3	17.7	83.4	42.5	4.3	166.0	18.3	32.6
28	198.0	335.5	97.0	34.6	39.7	12.4	36.6	14.5	5.2	267.0	16.9	36.8
29	138.0	142.5	138.0	34.6	36.2	9.8	26.4	12.2	13.3	249.5	11.8	36.4
30	58.1	.....	138.0	41.6	228.5	13.3	20.3	8.6	20.7	80.0	9.9	28.4
31	58.1	.....	101.0	.....	293.0	.....	13.4	12.4	.....	41.8	.....	35.9

Monthly discharge of Tohickon Creek near Point Pleasant, Pa., for 1907–8.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	2,070	92.7	378	3.71	4.28
February	404	26.8	137	1.34	1.40
March	2,980	26.1	743	7.28	8.39
April	1,420	34.6	129	1.26	1.41
May	552	21.8	93.6	.918	1.06
June	1,040	13.6	99.3	.974	1.09
July	164	5.7	35.8	.351	.40
August	26.8	2.9	8.50	.083	.10
September	4,120	4.6	384	3.76	4.20
October	2,640	23.1	283	2.77	3.19
November	1,760	55.4	444	4.35	4.85
December	2,550	60.6	434	4.25	4.90
The year	4,120	2.9	264	2.59	35.27
1908.					
January	1,700	58.1	245	2.40	2.77
February	2,770	44.0	473	4.64	5.00
March	2,260	58.5	319	3.13	3.61
April	171	30.7	66.3	.650	.72
May	1,380	36.2	300	2.94	3.39
June	162	9.8	32.6	.320	.36
July	160	4.3	17.6	.173	.20
August	42.5	2.7	9.38	.092	.11
September	20.7	2.0	5.83	.057	.06
October	267	2.2	32.7	.321	.37
November	25.8	5.0	14.7	.144	.16
December	205	8.6	50.2	.492	.57
The year	2,770	2.0	130	1.28	17.32

NESHAMINY CREEK BELOW FORKS, PENNSYLVANIA.

Neshaminy Creek rises in the eastern part of Montgomery County, Pa., flows in a southeasterly and southerly course, and enters Delaware River at a point about 12 miles above Philadelphia. The drainage area, measured at the forks of the Big and Little Neshaminy, is 139 square miles, mostly farm land in a high state of cultivation, the original forest growth having been almost entirely cut away. The stream is subject to very sudden freshets and during heavy rains large quantities of surface soil are eroded.

Continuous records of discharge have been obtained since 1884 by the Philadelphia bureau of water, department of public works, under the personal supervision of John E. Codman, by whom the records have been furnished. The station is located a short distance below the junction of Big and Little Neshaminy creeks, and the discharge represents about one-half of the total drainage area of the stream. The fall of the stream from its source to the gaging station is about 600 feet in 27 miles.

An automatic gage is used to obtain a continuous record of gage height. The lower part of the rating curve has been developed from the computed discharge over a weir, and the discharge at high stages is determined from a curve developed from current-meter measurements. The rating curve is well defined.

Daily discharge, in second-feet, of Neshaminy Creek below forks, Pennsylvania, for 1907 8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1,253.5	278.5	162.0	134.5	117.0	80.0	192.0	26.0	13.5	276.5	221.0	224.5
2	411.3	217.0	207.5	129.5	108.0	1,312.2	98.5	28.0	14.0	190.5	608.3	207.5
3	330.5	248.0	683.0	115.0	99.5	443.2	89.0	26.0	17.0	161.0	1,534.2	184.0
4	653.0	201.5	884.0	108.5	495.8	227.0	80.0	19.7	17.2	198.0	365.5	172.0
5	468.5	157.0	590.5	99.0	232.7	198.0	60.0	20.2	18.0	191.0	259.5	168.0
6	272.0	149.0	473.0	91.5	162.0	183.5	47.0	21.2	30.7	132.5	548.0	162.0
7	242.0	159.0	394.5	89.5	159.0	140.5	44.5	25.7	36.0	118.0	1,106.6	162.0
8	253.5	164.0	433.5	212.0	143.5	122.0	46.0	25.7	23.5	767.0	480.5	164.0
9	829.5	235.5	689.0	309.0	161.0	111.0	51.5	128.1	19.0	417.5	343.0	167.0
10	276.5	290.5	1,190.7	350.0	175.5	96.5	49.5	103.5	19.5	186.5	524.5	1,513.0
11	203.0	285.0	488.5	208.5	223.5	85.5	47.5	47.0	16.0	160.0	526.5	984.5
12	1,626.2	269.0	242.0	159.5	158.5	80.0	50.0	32.5	19.0	150.0	289.5	291.0
13	815.6	236.0	1,160.7	147.0	124.0	79.0	44.5	23.5	20.5	137.5	242.5	227.5
14	1,284.2	221.5	4,033.5	144.0	113.0	88.5	36.0	21.0	16.7	114.0	210.5	497.2
15	669.3	213.0	2,714.0	124.5	99.5	92.0	38.0	18.0	15.0	99.5	184.0	1,322.0
16	493.5	208.0	1,233.7	113.0	876.6	82.5	35.5	17.0	14.0	94.0	169.5	671.0
17	303.0	203.0	960.0	106.5	804.5	73.5	27.5	17.8	13.5	90.0	159.0	436.0
18	303.0	238.5	888.3	96.0	306.0	71.0	61.5	18.0	14.0	85.0	196.5	306.0
19	303.0	237.0	680.0	104.5	367.0	72.0	126.7	18.0	20.2	77.0	1,005.3	250.1
20	303.0	206.5	1,603.3	114.0	360.0	63.0	136.5	17.0	24.0	72.0	328.5	221.5
21	330.0	188.5	571.0	100.5	196.0	63.0	63.5	16.5	18.7	72.0	300.0	200.5
22	357.0	165.0	436.0	94.0	154.0	63.0	39.0	17.0	15.5	72.0	382.5	176.0
23	357.0	165.0	377.0	132.0	138.5	49.5	31.0	16.0	924.3	68.0	259.0	3,058.5
24	348.5	159.0	313.0	1,258.2	129.0	44.5	31.0	43.7	1,674.2	64.0	2,297.0	1,016.0
25	340.0	168.5	249.5	507.5	116.0	43.5	26.5	138.0	519.0	58.0	1,681.0	428.5
26	331.0	169.5	206.5	187.5	111.0	92.5	22.0	62.5	159.0	50.5	551.0	332.0
27	322.0	167.0	194.0	193.5	124.0	200.5	21.2	31.5	96.0	65.0	305.5	287.0
28	322.0	167.0	181.5	158.0	119.0	82.5	20.0	26.0	353.0	2,258.0	338.0	256.5
29	312.5	.....	166.5	138.5	100.5	72.0	21.5	23.0	4,634.3	2,368.0	289.0	227.5
30	303.5	.....	151.0	127.0	82.0	538.0	25.0	18.0	527.2	448.6	246.5	352.5
31	294.5	.....	134.5	.....	80.0	.....	26.5	15.0	.....	282.0	.....	392.5
1908.												
1	303.5	1,506.4	175.0	237.5	285.2	207.0	28.0	19.0	63.0	40.5	129.5	42.0
2	249.0	499.0	145.0	293.2	121.0	144.5	41.5	17.5	59.0	30.5	103.5	40.5
3	217.0	256.0	151.5	255.0	85.5	120.0	73.0	17.2	51.0	29.5	86.5	41.0
4	196.0	227.5	158.0	157.0	72.5	110.0	88.0	19.3	46.5	26.2	80.0	41.0
5	196.0	213.0	199.5	144.0	72.0	91.5	76.0	21.0	43.0	21.2	68.5	41.0
6	183.0	213.0	149.5	145.0	68.0	88.0	45.0	20.5	56.5	17.7	55.0	41.0
7	323.0	213.0	738.3	135.0	1,825.0	84.5	27.5	180.0	62.5	15.5	52.0	1,173.2
8	527.7	200.5	455.0	184.5	1,138.0	76.5	29.0	210.5	44.5	16.5	50.0	404.7
9	293.0	188.0	1,283.7	259.5	244.5	72.0	24.7	55.0	38.5	17.5	46.5	178.5
10	208.0	188.0	376.5	163.5	291.0	72.0	20.8	29.0	46.5	17.7	46.5	141.0
11	179.0	176.0	287.0	154.0	222.5	72.0	21.7	948.0	22.5	19.7	44.5	146.0
12	777.5	164.0	271.0	145.5	171.0	68.0	22.5	394.6	22.5	21.5	42.5	236.2
13	1,222.3	369.0	274.0	117.0	143.5	61.0	22.5	113.5	28.5	20.7	42.5	209.5
14	501.0	2,314.8	286.5	101.0	138.5	56.0	23.7	68.5	29.0	17.5	41.0	140.5
15	346.5	2,719.4	323.0	111.5	378.2	121.0	23.5	47.5	27.0	16.5	41.0	124.0
16	292.0	593.3	303.5	136.0	502.5	584.5	21.3	36.0	26.5	15.7	41.0	106.5
17	247.5	270.0	227.5	124.5	239.0	126.0	18.7	30.5	27.0	13.2	42.5	105.5
18	206.0	200.0	563.7	105.0	1,135.0	84.5	18.0	27.0	22.5	13.2	54.0	192.0
19	190.0	873.7	2,085.5	119.0	245.0	81.0	16.5	23.0	21.0	14.5	97.5	252.0
20	178.0	1,256.0	339.0	133.0	272.5	62.5	16.5	20.5	18.3	13.5	128.0	207.0
21	176.0	382.7	330.5	110.5	280.0	54.0	20.5	19.5	15.0	13.5	103.5	167.5
22	186.0	270.0	271.5	84.5	373.2	54.0	22.0	19.0	15.0	13.2	75.5	134.5
23	184.0	187.5	517.5	83.0	301.2	47.0	30.5	17.3	15.5	13.0	70.0	110.0
24	161.5	175.0	481.2	78.5	235.5	42.5	484.5	18.7	16.5	14.5	67.0	105.0
25	172.5	175.0	268.0	71.5	182.0	42.5	129.6	22.3	17.0	16.0	60.0	115.0
26	188.0	2,618.2	201.5	62.5	154.0	41.0	489.0	2,659.6	17.7	703.5	55.0	120.0
27	303.0	565.0	183.0	68.0	138.5	33.5	120.5	451.5	16.0	497.0	62.0	110.0
28	268.0	264.5	191.5	71.0	119.0	26.0	38.0	207.5	35.0	613.0	59.5	105.0
29	221.5	164.5	159.0	62.0	105.0	28.5	36.0	119.5	249.3	622.2	46.5	103.5
30	177.0	.....	151.5	107.0	520.0	31.0	29.3	91.5	95.5	546.0	44.0	123.0
31	152.0	.....	220.0	.....	811.5	.....	21.3	75.0	.....	191.0	.....	186.0

Monthly discharge of Neshaminy Creek below forks, Pennsylvania, for 1907–8.

[Drainage area, 139 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	1,630	203	481	3.46	3.99
February	290	149	206	1.48	1.54
March	4,030	134	732	5.27	6.08
April	1,260	89.5	195	1.40	1.56
May	877	80	214	1.54	1.78
June	1,310	43.5	165	1.19	1.33
July	192	20	54.5	.392	.45
August	138	15	34.2	.246	.28
September	4,630	13.5	310	2.23	2.49
October	2,370	50.5	307	2.21	2.55
November	2,300	159	532	3.83	4.27
December	3,060	162	486	3.50	4.04
The year	4,630	13.5	310	2.23	30.36
1908.					
January	1,220	152	291	2.09	2.41
February	2,720	164	601	4.32	4.66
March	2,090	145	380	2.73	3.15
April	293	62	134	.964	1.08
May	1,820	68	351	2.53	2.92
June	584	26	92.8	.668	.75
July	489	16.5	67.1	.483	.56
August	2,660	17.2	194	1.40	1.61
September	249	15	41.6	.299	.33
October	704	13	117	.842	.97
November	130	41	64.5	.464	.52
December	1,170	40.5	169	1.22	1.41
The year	2,720	13	209	1.50	20.37

SCHUYLKILL RIVER NEAR PHILADELPHIA, PA.

Schuylkill River rises in the central part of Schuylkill County, Pa., flows southeastward, and unites with the Delaware at Philadelphia. Its length is about 100 miles and its drainage area measures about 1,920 square miles. The headwaters of the river lie in a mountainous, coal-bearing region, but 25 or 30 miles below its source it enters a more highly cultivated country, and the slope becomes more gentle. There are no lakes in the basin, but there are three artificial reservoirs (Silver Creek and Lower and Upper Tumbling Run Reservoirs) constructed for the benefit of navigation. The flow of the river is tolerably constant, but the freshets, notwithstanding the considerable storage, are severe. The Schuylkill is navigable for ocean-going vessels only as far as Fairmount, 8.4 miles from the mouth, where the first dam is built across the river. Above that point it is navigable for river boats as far as Schuylkill Haven.

With the exception of a small amount of water drawn from the Delaware, the entire water supply for the city of Philadelphia comes from the Schuylkill. The river receives a large amount of pollution from various sources, and a filtering plant for the city has been nearly completed.

Records of the height of the river at Fairmount Pool have been kept for many years, but not in such form as to be useful for the computation of daily discharges. Beginning with 1898, however, careful estimates have been prepared by the Philadelphia bureau of water, department of public works, under the personal supervision of John E. Codman, by whom the records have been furnished. The station is located at the Fairmount dam near Philadelphia.

The computed daily discharges represent the total flow of the river as determined from the amount wasted over the flashboards at the Fairmount dam, the pumpage from the river, the leakage, and the quantity used for power at Fairmount.

Daily discharge, in second-feet, of Schuylkill River near Philadelphia, Pa., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	21,017	1,952	1,762	2,151	1,621	1,041	1,603	1,046	987	6,903	1,846	3,563
2	11,857	1,952	1,762	2,151	1,621	3,235	1,603	1,046	987	3,907	1,903	3,173
3	6,260	2,106	2,112	1,949	1,621	2,908	1,300	1,046	987	3,073	8,342	2,823
4	3,731	1,952	1,886	1,856	1,621	1,280	1,124	1,046	987	2,855	5,552	2,487
5	3,531	1,805	1,762	1,781	1,621	1,041	1,124	1,046	987	2,939	4,109	2,406
6	2,325	1,714	1,762	1,929	1,621	1,041	1,124	1,046	1,247	2,938	4,004	2,333
7	1,931	1,714	1,762	2,111	1,621	1,041	1,124	1,046	987	2,587	16,158	2,263
8	1,794	1,714	1,823	2,111	1,621	1,041	1,384	1,046	987	2,672	5,932	2,333
9	2,493	1,714	2,237	2,388	1,621	1,041	1,124	1,111	987	19,048	3,761	2,076
10	1,929	1,714	2,562	2,041	1,621	1,041	1,124	1,046	987	10,784	3,785	8,979
11	1,702	1,799	2,144	1,911	1,621	1,041	1,124	1,046	987	3,498	4,867	24,430
12	3,350	1,716	1,889	1,781	1,621	1,041	1,124	1,046	2,685	2,954	3,234	17,940
13	6,765	1,714	3,485	1,781	1,621	1,041	1,124	1,046	2,076	2,716	2,529	9,540
14	9,035	1,714	14,916	1,781	1,621	1,041	1,124	1,046	1,294	2,336	2,096	7,370
15	8,848	1,714	21,485	1,781	1,621	1,041	1,124	1,046	987	2,126	2,042	11,225
16	3,725	1,714	14,355	1,781	1,621	1,041	1,124	1,046	987	2,126	1,787	8,980
17	3,016	1,714	7,726	1,781	1,713	1,041	1,124	1,046	987	1,946	1,793	7,170
18	2,694	1,714	6,270	1,781	1,713	1,041	1,124	1,046	987	1,792	1,954	5,271
19	2,694	1,714	4,993	1,781	1,636	1,041	1,218	1,046	987	1,686	4,405	4,742
20	6,518	1,714	7,824	1,781	1,621	1,041	1,124	1,046	987	1,608	3,666	4,300
21	6,776	1,714	6,874	1,781	1,621	1,041	1,124	1,046	1,106	1,608	2,804	3,656
22	3,126	1,714	4,584	1,781	1,621	1,041	1,124	1,046	987	1,608	3,736	3,266
23	2,887	1,714	3,528	1,781	1,621	1,041	1,124	1,046	8,650	1,608	3,234	13,781
24	2,736	1,714	3,178	4,067	1,621	1,041	1,124	1,046	23,671	1,608	6,238	16,838
25	2,610	1,714	2,997	3,185	1,621	1,041	1,124	1,046	9,781	1,608	12,943	10,003
26	2,518	1,714	2,592	2,149	1,621	1,041	1,124	1,138	4,900	1,608	9,467	7,163
27	2,222	1,714	2,472	1,781	1,621	1,041	1,124	1,046	2,945	1,608	7,687	5,112
28	2,058	1,714	2,382	1,781	1,621	1,041	1,124	1,046	2,606	4,599	7,142	3,631
29	2,022	.....	2,317	1,781	1,621	1,041	1,124	1,046	23,895	6,548	5,737	3,241
30	2,020	.....	2,292	1,781	1,621	1,466	1,124	1,046	10,627	4,331	4,311	4,063
31	1,998	.....	2,293	.....	1,621	.....	1,124	1,046	.....	2,304	.....	4,300
1908.[a]												
1	4,215	2,876	4,876	3,874	1,512	1,382	688	561	404	601	464	822
2	3,825	4,954	4,418	3,966	1,512	1,259	688	561	404	601	464	822
3	3,382	2,547	4,418	3,336	1,470	1,122	688	561	404	601	464	822
4	2,901	2,362	4,418	3,202	1,470	988	747	561	404	601	464	822
5	2,675	1,895	4,237	3,070	1,470	988	688	561	404	601	464	822
6	2,820	1,606	4,192	3,070	1,419	988	688	561	404	601	464	822
7	3,301	1,606	4,738	2,962	4,755	988	688	561	404	601	464	822
8	4,469	1,606	6,878	2,962	21,796	988	688	561	404	601	464	822
9	4,469	1,606	8,893	3,330	17,141	988	688	561	404	601	464	822
10	3,301	1,584	7,277	3,330	10,341	988	688	561	404	601	464	822
11	2,582	1,602	5,175	2,962	6,429	988	688	561	404	601	464	822
12	6,794	1,584	5,141	2,962	4,059	988	688	670	404	601	464	822
13	13,404	1,689	5,298	3,030	3,154	988	688	561	404	601	464	822
14	8,599	2,805	5,411	2,594	2,771	988	688	561	404	601	464	822
15	5,456	18,454	5,454	2,550	4,003	988	688	561	404	601	464	822

[a] Several consecutive days of constant values of discharge do not mean that there was no variation in flow, but that the discharge was computed by periods of several days and the total distributed uniformly. The variation during these periods was relatively small.

Daily discharge, in second-feet, of Schuylkill River, near Philadelphia, Pa., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.[a]												
16	3,920	29,615	5,768	2,502	5,721	2,029	688	561	404	601	464	822
17	3,556	8,944	5,316	2,698	5,271	1,182	688	561	404	601	464	822
18	2,694	5,158	5,221	2,242	5,894	988	688	561	404	601	464	822
19	2,980	5,052	16,760	2,282	3,961	988	688	561	404	601	464	822
20	2,980	6,702	12,702	2,862	2,866	988	688	561	404	601	464	822
21	2,980	3,679	8,322	2,912	2,771	988	688	561	404	601	464	822
22	2,675	3,679	6,181	2,466	6,105	988	688	561	404	601	464	822
23	2,675	3,120	5,454	2,278	5,343	988	688	561	404	601	464	822
24	2,437	3,120	5,278	2,270	3,862	988	1,001	561	404	601	464	822
25	2,199	29,479	4,845	2,006	3,468	988	6,001	561	404	623	464	822
26	2,115	29,559	4,301	2,006	2,631	988	10,208	1,574	404	731	464	822
27	2,353	11,989	4,108	2,590	2,197	988	3,106	561	404	1,131	464	822
28	2,675	6,403	4,024	2,041	1,752	988	1,247	561	404	601	464	822
29	2,547	4,964	4,217	1,874	1,470	988	688	561	404	601	464	822
30	2,178	.....	4,301	1,874	1,880	988	688	561	512	601	468	822
31	1,928	.....	4,136	.....	1,968	.....	688	561	.....	601	.....	832

[a] Several consecutive days of constant values of discharge do not mean that there was no variation in flow, but that the discharge was computed by periods of several days and the total distributed uniformly. The variation during these periods was relatively small.

Monthly discharge of Schuylkill River near Philadelphia, Pa., for 1907–8.

[Drainage area, 1,920 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	21,000	1,700	4,390	2.29	2.64
February	2,110	1,710	1,760	.917	.95
March	21,500	1,760	4,520	2.35	2.71
April	4,070	1,780	2,010	1.05	1.17
May	1,710	1,620	1,630	.849	.98
June	3,240	1,040	1,200	.625	.70
July	1,600	1,120	1,170	.609	.70
August	1,140	1,050	1,050	.547	.68
September	23,900	987	3,740	1.95	2.13
October	19,000	1,610	3,530	1.84	2.12
November	16,200	1,790	4,900	2.55	2.84
December	24,400	2,080	6,720	3.50	4.04
The year	24,400	987	3,050	1.59	21.66
1908.					
January	13,400	1,930	3,710	1.93	2.22
February	29,600	1,580	6,900	3.59	3.87
March	16,800	4,020	5,860	3.05	3.52
April	3,970	1,870	2,740	1.43	1.60
May	21,800	1,420	4,530	2.36	2.72
June	2,030	988	1,060	.552	.62
July	10,200	688	1,270	.661	.76
August	1,570	561	597	.311	.36
September	512	404	408	.212	.24
October	1,130	601	623	.324	.37
November	468	464	464	.242	.27
December	832	822	822	.428	.49
The year	29,600	404	2,420	1.26	17.04

PERKIOMEN CREEK NEAR FREDERICK, PA.

Perkiomen Creek rises in the western part of Bucks County, Pa., flows southward, and discharges into the Schuylkill about 7 miles above Norristown and 18 miles above Philadelphia. Its drainage area comprises about 345 square miles. The area is mostly in farm

land under a high state of cultivation, the original forest growth having been almost entirely cut away. The stream is subject to very sudden freshets, and during heavy rains large quantities of surface soil are eroded.

Continuous records of discharge have been obtained since 1884 by the Philadelphia bureau of water, department of public works, under the personal supervision of John E. Codman, by whom the following records have been furnished. The station is located about 12 miles above the mouth of the creek and above the East Branch, and the discharge represents about one-third of the total area drained by the stream. The fall of the creek from its source to the gaging station is about 800 feet in 24 miles.

An automatic gage is used to obtain a continuous record of gage height. The lower part of the rating curve has been developed from the computed discharge over a weir, and the discharge at high stages is determined from a curve developed from current-meter measurements. The rating curve is well defined.

Daily discharge, in second-feet, of Perkiomen Creek near Frederick, Pa., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1,770.0	128.0	92.0	152.5	163.0	56.2	211.5	30.9	30.5	363.5	168.0	254.0
2	586.0	130.0	292.5	148.0	168.0	1,139.4	112.0	30.9	30.0	247.5	608.0	233.0
3	419.0	141.0	611.3	128.0	128.0	506.0	190.0	57.4	35.8	199.0	1,638.5	213.0
4	589.2	150.0	449.5	117.5	211.5	259.0	115.0	64.9	39.6	223.5	402.5	209.0
5	493.4	150.0	287.5	114.5	236.5	194.0	71.0	45.8	56.3	241.5	260.5	199.0
6	311.5	150.0	204.0	102.0	151.0	154.0	51.0	43.2	83.5	180.0	530.1	181.0
7	265.0	150.0	159.0	92.0	136.0	112.0	45.8	33.5	79.5	145.0	3,113.0	179.0
8	260.0	150.0	143.5	270.0	133.0	85.0	51.5	26.3	62.5	1,381.0	556.0	185.0
9	597.5	150.0	259.5	289.8	175.0	75.0	58.0	235.5	96.0	470.0	389.0	211.0
10	232.0	150.0	393.5	279.2	152.5	73.5	55.0	160.5	120.5	293.5	626.0	2,648.5
11	159.5	150.0	243.5	199.0	146.0	79.5	105.0	84.0	869.0	231.5	545.0	920.0
12	948.5	150.0	183.0	148.0	126.0	67.0	165.0	56.4	626.0	198.0	326.0	446.0
13	851.5	131.0	977.0	125.0	112.5	67.0	129.5	50.7	188.5	169.0	263.5	316.5
14	1,217.8	112.0	3,452.0	125.0	99.5	71.0	72.5	50.7	123.5	150.0	219.5	423.0
15	681.2	112.0	1,853.7	119.5	94.0	77.5	53.1	45.8	87.5	133.0	188.0	1,005.0
16	416.0	111.5	1,642.3	111.0	142.0	73.5	41.8	38.3	66.5	113.5	169.0	687.0
17	265.5	111.0	1,219.8	106.0	279.5	67.0	41.8	30.9	62.5	106.0	158.0	479.0
18	238.5	111.0	801.7	96.5	210.0	64.5	219.0	30.9	56.4	101.0	279.5	362.5
19	263.5	106.0	732.5	97.5	156.0	60.0	173.5	30.9	132.4	94.0	705.8	308.0
20	1,139.8	91.5	1,583.0	108.5	105.5	54.3	101.5	28.6	219.0	85.5	342.0	257.5
21	572.5	105.0	855.5	103.0	68.5	58.8	132.5	26.3	193.5	93.5	401.7	231.0
22	287.5	118.0	552.0	96.5	55.3	67.0	91.5	28.6	168.0	94.0	560.5	214.0
23	242.5	118.0	475.0	129.5	38.6	62.5	65.0	30.9	4,017.4	88.5	353.0	2,815.5
24	204.0	114.0	404.0	1,009.1	37.5	51.9	51.9	79.4	2,163.3	84.5	842.0	1,230.0
25	164.0	111.0	319.5	323.5	38.6	45.8	42.2	273.8	582.5	76.0	1,616.5	494.0
26	164.0	111.0	254.5	225.5	37.0	45.8	34.7	116.5	284.5	71.5	823.3	396.5
27	168.0	93.0	221.0	139.0	63.7	45.8	30.9	60.4	201.0	80.0	564.0	338.5
28	154.0	83.5	210.0	148.0	92.0	45.8	30.9	44.7	320.5	1,286.2	404.0	304.0
29	141.0	.....	203.0	137.5	83.5	60.4	30.9	39.6	4,851.2	619.8	346.0	278.0
30	130.0	.....	188.0	137.5	95.0	433.2	30.9	33.2	717.3	358.6	303.5	526.5
31	128.0	.....	162.5	.....	118.0	.....	30.9	30.9	.....	216.5	.....	543.0
1908.												
1	267.5	527.0	246.5	249.0	193.3	178.5	53.3	54.3	31.4	53.8	38.8	40.6
2	216.0	591.5	198.0	338.0	199.0	128.0	53.8	44.6	27.6	46.3	38.8	40.6
3	176.0	345.0	217.0	274.0	157.5	96.5	43.7	35.6	33.7	47.8	41.7	40.6
4	173.5	291.5	208.0	190.0	137.5	75.0	50.8	36.1	26.3	41.7	49.7	38.0
5	158.0	249.0	185.0	165.0	122.0	75.0	58.0	41.6	17.3	38.1	38.6	33.2
6	187.5	249.0	179.0	173.0	113.5	73.5	53.1	39.6	19.0	48.3	39.1	33.2
7	835.5	212.0	680.2	160.0	1,991.0	33.5	47.0	55.3	13.9	64.3	35.4	213.0
8	1,006.0	186.0	618.0	207.5	1,126.0	42.0	45.8	65.3	13.9	53.8	27.2	235.5
9	270.0	178.0	950.7	330.8	753.5	58.0	48.2	50.7	13.9	40.7	33.3	130.0
10	177.0	168.0	442.0	208.0	434.0	54.9	48.2	45.8	10.2	38.1	40.6	83.5

Daily discharge, in second-feet, of Perkiomen Creek near Frederick, Pa., for 1907–8.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
11	171.0	148.0	336.0	194.0	319.5	43.7	42.3	78.4	13.9	33.2	38.0	71.0
12	2,245.5	138.0	322.0	172.0	254.5	40.6	40.7	71.0	17.6	33.2	36.5	89.0
13	1,615.7	169.0	338.5	141.0	203.0	45.8	50.7	62.5	18.9	40.6	36.5	114.5
14	522.0	560.2	343.5	140.0	172.0	45.8	48.2	51.9	17.0	44.7	40.6	114.5
15	320.5	5,571.8	354.0	145.0	676.0	62.4	67.4	43.2	14.6	42.2	37.9	93.0
16	281.5	846.5	469.0	245.0	746.3	421.0	73.5	36.7	12.8	38.1	35.8	71.0
17	244.5	452.9	305.0	179.0	267.0	152.5	54.9	34.1	10.2	33.2	42.7	71.0
18	208.0	279.2	821.5	144.0	877.6	91.0	48.8	39.6	11.7	28.5	43.7	83.5
19	182.5	437.0	2,256.2	173.0	395.5	78.0	43.2	39.6	14.3	28.1	48.4	101.5
20	158.0	975.0	641.0	208.0	277.5	72.0	77.3	76.3	14.3	27.2	61.5	101.5
21	164.0	501.0	398.0	184.0	261.0	64.5	99.3	87.5	16.2	30.9	62.8	101.5
22	164.0	359.5	318.0	153.5	224.5	68.5	43.2	46.2	19.3	35.5	45.5	93.0
23	160.0	253.5	325.0	137.5	269.5	71.0	72.1	32.3	18.1	33.2	43.1	62.2
24	164.0	212.0	438.7	125.0	293.0	71.0	554.0	29.1	21.9	33.2	49.5	53.7
25	164.0	175.0	325.5	137.0	206.5	61.5	1,349.7	37.5	22.8	59.7	50.0	58.0
26	164.0	3,787.1	253.5	149.5	162.0	58.0	693.0	64.9	20.6	205.9	51.9	66.5
27	243.0	838.5	209.0	129.0	249.5	55.6	275.0	101.5	20.2	226.2	46.2	71.0
28	312.0	372.2	216.0	113.5	129.0	49.5	109.5	71.3	24.7	93.0	41.1	62.2
29	245.5	298.0	295.0	116.0	110.0	44.7	90.0	49.5	105.8	96.5	38.6	58.0
30	188.0	.....	295.0	116.0	248.5	43.2	65.4	41.4	92.5	88.0	38.0	57.4
31	188.0	.....	249.0	.....	205.0	.....	54.9	35.5	.....	51.5	.....	60.9

Monthly discharge of Perkiomen Creek near Frederick, Pa., for 1907–8.

[Drainage area, 152 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	1,770	128	454	2.99	3.45
February	150	83.5	125	.822	.86
March	3,450	92.0	627	4.12	4.75
April	1,010	92.0	179	1.18	1.32
May	280	37.0	124	.816	.94
June	1,140	45.8	142	.934	1.04
July	219	30.9	85.0	.559	.64
August	274	26.3	62.6	.412	.48
September	4,850	30.0	552	3.63	4.05
October	1,380	71.5	264	1.74	2.01
November	3,110	158	590	3.88	4.33
December	2,820	179	551	3.62	4.17
The year	4,850	26.3	313	2.06	28.04
1908.					
January	2,250	158	373	2.45	2.82
February	5,570	138	668	4.39	4.74
March	2,260	179	433	2.85	3.29
April	338	114	180	1.18	1.32
May	1,990	110	383	2.52	2.90
June	421	33.5	81.8	.538	.60
July	1,350	40.7	144	.948	1.09
August	102	29.1	51.6	.339	.39
September	106	10.2	23.8	.157	.18
October	226	27.2	57.3	.377	.43
November	62.8	27.2	42.4	.279	.31
December	236	33.2	82.0	.539	.62
The year	5,570	10.2	210	1.38	18.69

MISCELLANEOUS MEASUREMENTS IN DELAWARE RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in Delaware River drainage basin during 1906 and 1908:

Miscellaneous measurements in Delaware River basin.

Date.	Stream.	Locality.	Width.	Area of section.	Gage height.	Discharge.
			Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1906. November 3	Mongaup River	Oil pipe crossing 1 mile below falls and about 7 miles from Rio, N.Y.	.....	.....	(a)	156
1908. May 10	do	Highway bridge at Partridge ranch, 2 miles below falls and about 6 miles from Rio, N. Y.	.....	.....	b 2.32	758
September 4	do	do	.....	.....	b. 57	24
February 17 c	Lehigh River	Bethlehem, Pa	339	1,940	.....	8,050
Do. c	Monocacy Creek	do	44	86	.....	128

a Reference point over rock 30 feet north of bridge; 2.1 feet to water edge.
b Gage height from standard chain gage.
c Measurements made at New Street Bridge at gaging station, maintained 1902–1905.

SUSQUEHANNA RIVER DRAINAGE BASIN.

DESCRIPTION.

Susquehanna River rises in Otsego Lake, in northern Otsego County, N. Y., at an elevation of 1,193 feet above tide, and flows in a general southerly direction into Chesapeake Bay. Its course is in many places extremely tortuous, crossing the state boundary between New York and Pennsylvania three times. The entire length of the river is about 500 miles, and it drains an area of 27,400 square miles, of which 21,060 square miles lie in Pennsylvania, 6,080 in New York, and 260 in Maryland.

The topography of the basin varies widely in character. In New York the stream and its tributaries flow through a rolling and in places rather broken country, bounded on the north by a mountainous area. In this part of its course its bed is of gravel or sand, with occasional rock ledges, and its banks are moderately high and not extensively subject to overflow. In Pennsylvania the river enters a mountain region, its banks are high, and it winds and twists among the parallel ranges in a bed composed generally of drift materials, gravels, sand, and bowlders. In the lower part of its course, from Marietta to Havre de Grace, it occupies a broad, deep valley, varying in width from a few hundred feet to more than a mile, and is for the most part bounded on either shore by rocky bluffs and table-lands elevated from 100 to 500 feet above its waters.

Above the mouth of the West Branch the fall of the stream is uniform and gradual; below that point the fall becomes more irregular, and there are at many places rapids where the stream flows over a rocky bottom. The elevation of the river at the mouth of the West Branch is 400 feet above mean sea level at Havre de Grace, the distance between the two points being 125 miles. The slope is, however, extremely variable.

The fall in the lower part of the river offers exceptional opportunities for power developments, the value of which is greatly enhanced by their proximity to an unlimited market in the adjacent large cities. The hydrographic investigations of the Geological Survey along Susquehanna River have been of great assistance to engineers in investigating these powers.

In early days a complete system of canals was built along the river from the New York state line to the bay, but these have been abandoned with the establishment of railroads. The head of navigation is at the fall line, near the mouth of the stream, but various stretches are navigable for flatboats.

All available hydrographic data for Susquehanna River basin prior to 1905 have been collected and published in Water-Supply Papers Nos. 108 and 109. No. 108 treats principally of the quality

of the water, and No. 109 gives in detail information relative to fluctuations in stage and quantity of water flowing.

Gaging stations have been maintained in this basin as follows:

Susquehanna River at Colliersville, N. Y. (1907–8).
Susquehanna River at Binghamton, N. Y. (1901–1908).
Susquehanna River at Wysox, Pa. (1908).
Susquehanna River at Wilkes-Barre, Pa. (1899–1908).
Susquehanna River at Danville, Pa. (1899–1908).
Susquehanna River at Harrisburg, Pa. (1891–1908).
Susquehanna River at McCall Ferry, Pa. (1902–1908).
Chenango River at South Oxford, N. Y. (1903).
Chenango River near Greene, N. Y. (1908).
Chenango River at Binghamton, N. Y. (1901–1908).
Eaton Brook, Madison County, N. Y. (1835).
Madison Brook, Madison County, N. Y. (1835).
Tioughnioga River at Chenango Forks, N. Y. (1903).
Cayuta Creek at Waverly, N. Y. (1898–1902).
Chemung River at Chemung, N. Y. (1903–1908).
West Branch of Susquehanna River at Williamsport, Pa. (1895–1908).
West Branch of Susquehanna River at Allenwood, Pa. (1899–1902).
Juniata River at Newport, Pa. (1899–1908).
Broad Creek at Mill Green, Md. (1904–1908).
Octararo Creek at Rowlandsville, Md. (1896–1899).
Deer Creek near Churchville, Md. (1904–1908).

STATIONS ON MAIN STREAM.

SUSQUEHANNA RIVER AT COLLIERSVILLE, N. Y.

During 1907 a hydro-electric development was made about one-half mile upstream from Colliersville on Susquehanna River, consisting of a reenforced concrete dam affording a head of from 31 to 33 feet, with rollway 200 feet long, and with an installation of two 1,000-kilowatt units. Power is transmitted to the power house of the Oneonta and Mohawk Valley Railroad Company at Hartwick.

During a portion of 1907 gagings of flow of Susquehanna River were made at this point under the direction of William Barclay Parsons, consulting engineer on the above plant, and these data consisting of daily discharges have been supplied through their courtesy.

The gagings were by float measurements made with a bottle arranged to float just under the surface, and were made to ascertain approximately the relative flow of the river at different times, no especial care being taken to get accurate results. To the figures obtained in this way a coefficient of 0.90 has been applied, and results are given in the accompanying table.

A temporary low-water station was established at this point, September 7, 1908, and continued during the rest of the season. The datum of this gage has remained the same during the maintenance

of the station, and the rating curve is fairly well developed for the range of stage and period covered during 1908.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Susquehanna River at Colliersville, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
September 7	C. R. Adams	26.0	21.6	3.11	14.1
October 1	do	27.5	21.0	3.15	14.5

Daily gage height, in feet, of Susquehanna River at Colliersville, N. Y., for 1908.

[A. C. Choate, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	3.1	3.0	3.1	11	3.15	3.1	3.0	3.15	21	3.1	3.05	3.1	3.15
2	.....	3.1	3.0	3.1	12	3.15	3.1	3.1	4.15	22	3.1	3.1	3.1	3.1
3	.....	3.1	3.0	3.1	13	3.15	3.1	3.1	3.15	23	3.1	3.1	3.1	3.1
4	.....	3.1	3.0	3.1	14	3.15	3.1	3.1	3.15	24	3.1	3.1	3.1	3.1
5	.....	3.1	3.0	3.1	15	3.15	3.1	3.1	3.15	25	3.1	3.1	3.1	3.1
6	.....	3.1	3.0	3.1	16	3.15	3.1	3.1	3.15	26	3.1	3.1	3.1	3.1
7	3.1	3.1	3.0	3.1	17	3.12	3.05	3.1	3.1	27	3.1	3.1	3.1	3.2
8	3.1	3.1	3.0	3.1	18	3.1	3.05	3.1	4.1	28	3.1	3.05	3.1	3.2
9	3.15	3.1	3.0	3.1	19	3.1	3.05	5.1	3.1	29	3.1	3.0	3.1	3.2
10	3.15	3.1	3.0	3.1	20	3.1	3.05	3.1	3.1	30	3.1	3.0	3.1	3.2
										31	.....	3.0	.....	3.2

Rating table for Susquehanna River at Colliersville, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.00	11	3.10	14	3.20	17

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 2 discharge measurements made during 1908 and is approximate.

Daily discharge, in second-feet, of Susquehanna River at Colliersville, N. Y., for 1907-8.

Day.	May.	June.	July.	Aug.	Sept.	Day.	Sept.	Oct.	Nov.	Dec.
1907.						1908.				
1				246	128	1		106	11	14
2			557	167	110	2		91	11	14
3			375	194	158	3		106	11	14
4			302	194	481	4		106	11	14
5		396	253	160	790	5		14	11	14
6		455	229	247	459	6		14	11	14
7		513		283	346	7	14	91	11	14
8		449	194	248	346	8	60	14	11	14
9			231	194	346	9	16	14	181	14
10		380	207	194	388	10	108	14	11	14
11		320	221	182	425	11	16	14	14	16
12		311		194	504	12	16	160	11	222
13		248		203	423	13	16	106	14	16
14		239		168	367	14	16	14	14	16
15		239		173	328	15	16	14	14	16
16			374	168	327	16	16	14	14	16
17		181	374	198	344	17	15	12	14	14
18	716	194	641	169	302	18	14	12	14	234
19		227	342	148	281	19	14	12	246	14
20		215	544	146	237	20	14	12	14	14
21		233	470	170		21	14	12	14	16
22	472	204	391	190		22	14	14	14	14
23			314	111	253	23	14	14	14	14
24	414	183	314	109	477	24	14	14	14	14
25		219	407	105	365	25	14	14	14	14
26		194	378	146	347	26	14	14	14	14
27			337	103	342	27	14	153	14	17
28			292	111	347	28	14	12	14	17
29			267	122	482	29	14	11	14	17
30			261	94	780	30	14	11	14	17
31			246	121		31		11		164

Monthly discharge of Susquehanna River at Colliersville, N. Y., for 1908.

[Drainage area, 360 square miles.]

Month.	Discharge in second-feet.				Run-off (depth of inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
September 7 to 30	108	14	20.5	0.057	0.05
October	160	11	39.4	.109	.13
November	246	11	26.3	.073	.08
December	234	14	33.4	.093	.11

NOTE.—The ordinary gage height during the time of maintenance of this station in 1908 varied from about 3 to 3.20 feet and the discharge within these limits is well defined. It represents practically leakage by the plant. On days when the wheels were running at the power station the discharge has been computed from the number of hours the wheels were run, adding this to the leakage as shown by the gage height for the day. Gage heights observed on November 19, December 12, and December 18 have not been used in computations, but the leakage for these days assumed as 14 second-feet. The estimates of monthly discharge at this station are considered as fair.

SUSQUEHANNA RIVER AT BINGHAMTON, N. Y.

This station is located on the Washington Street Bridge at Binghamton. It was established July 31, 1901, and has since been maintained in cooperation with the New York state engineer department.

The station has been maintained to obtain general statistical and comparative data regarding the flow of the river at this point.

No important tributary enters Susquehanna River above the gaging station until Unadilla River is reached, about 50 miles upstream. Chenango River enters about 800 feet downstream, and causes backwater at high stages.

The Binghamton water-power dam is situated 2,800 feet upstream from the bridge, being a timber dam of 6-foot head.

The datum of the chain gage has remained the same during the maintenance of the station. During the winter months the discharge is usually affected but little by the ice conditions. The rating curve for low and medium stages is fairly well developed. High-water estimates are liable to considerable error due to backwater conditions from ice jams which form near Willow Point and also from high-water conditions in the Chenango.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Susquehanna River at Binghamton, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 20	Wood and Hoyt	300	1,160	2.10	1,170
1908.					
September 2[a]	C. R. Adams	234	275	1.79	321
September 28[a]	do	220	277	1.76	282
October 21	Wood and French	274	948	1.90	356
November 3	C. C. Covert	300	1,010	2.15	592

[a] Measurement made at Washington Street Bridge where the gage is located.

Daily gage height, in feet, of Susquehanna River at Binghamton, N. Y., for 1907–8.

[Hugh L. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	8.6	2.75	2.3	4.95	5.85	2.4	2.25	2.15	1.75	2.95	3.85	3.05
2	9.0	2.65	2.3	4.3	5.95	2.45	2.3	2.05	1.8	2.8	3.5	2.95
3	6.15	3.05	2.35	3.95	5.05	2.4	2.35	2.1	1.8	2.6	5.3	2.8
4	7.45	3.5	2.4	3.7	4.9	2.4	2.5	2.05	1.8	2.8	5.65	2.8
5	9.7	2.95	2.2	3.55	4.55	2.45	2.35	2.1	2.1	5.05	4.75	2.45
6	7.4	2.75	2.25	3.45	4.25	2.45	2.2	2.05	2.2	4.75	4.2	2.6
7	6.1	2.95	2.35	3.4	4.15	2.65	2.1	2.0	2.25	4.2	9.1	2.7
8	6.4	2.75	2.05	3.15	4.7	2.9	2.15	2.05	2.3	5.1	9.8	2.6
9	7.15	2.65	2.1	3.25	4.35	2.75	2.1	2.0	2.3	6.9	8.5	2.8
10	6.1	2.35	2.15	3.35	4.25	2.6	2.1	2.05	2.35	5.9	7.1	10.1
11	4.85	2.35	2.2	3.55	4.05	2.5	2.0	2.0	5.35	4.65	5.75	12.55
12	4.3	2.85	2.1	3.45	3.85	2.4	2.1	2.0	5.4	4.7	5.15	10.25
13	3.9	2.6	2.05	3.65	3.55	2.35	2.65	1.9	4.25	4.9	4.5	7.1
14	3.95	2.3	2.15	3.7	3.25	2.25	2.6	1.95	3.4	4.2	4.2	5.75
15	4.45	2.75	3.7	3.75	3.1	2.15	2.45	1.9	2.85	3.8	3.9	5.35
16	4.15	2.3	7.05	3.65	3.05	2.15	2.3	1.8	2.6	3.45	3.55	4.95
17	3.3	2.3	7.05	3.55	3.0	2.15	2.2	1.85	2.5	3.25	3.45	4.7
18	2.9	2.25	7.2	3.45	3.0	2.15	2.2	1.75	2.35	2.85	3.25	4.35
19	3.4	2.2	7.35	3.45	3.05	2.15	2.25	1.6	2.4	2.7	3.2	4.1
20	6.25	2.6	5.9	3.35	3.1	2.15	2.5	1.6	2.3	2.6	3.2	3.8
21	6.9	2.3	4.55	3.15	2.95	2.15	2.45	1.65	2.25	2.65	3.2	3.7
22	4.7	2.45	4.7	3.1	2.75	2.1	2.35	1.65	2.3	2.85	3.1	3.5
23	2.8	2.2	8.0	2.95	2.6	2.1	2.35	1.8	2.45	2.85	3.05	5.1
24	2.9	2.3	8.95	3.25	2.55	2.05	2.4	1.85	2.55	2.65	3.0	10.35
25	2.95	2.45	8.15	5.8	2.45	2.05	2.4	1.9	2.5	2.5	2.95	10.1
26	3.2	2.5	6.9	5.8	2.6	2.0	2.4	1.85	2.5	2.5	2.85	7.4
27	2.9	2.65	6.1	7.95	2.55	2.0	2.5	1.8	2.5	2.5	3.0	6.0
28	3.2	2.55	6.1	7.05	2.7	2.1	2.45	1.75	2.35	3.7	3.0	6.0
29	3.15	.....	7.1	6.45	2.7	2.1	2.45	1.8	2.2	5.85	3.15	7.35
30	3.0	.....	6.8	6.4	2.65	2.15	2.35	1.85	2.5	5.35	3.1	6.4
31	3.0	.....	.....	.....	2.5	.....	2.25	1.75	.....	4.35	.....	6.6
1908.[b]												
1	5.8	2.4	3.05	6.85	5.65	3.05	2.1	2.0	1.8	1.85	2.25	2.05
2	4.95	2.8	3.4	6.45	6.25	2.9	2.05	1.9	1.9	1.9	2.1	2.15
3	4.4	3.2	4.35	5.75	6.15	2.75	2.05	1.9	1.8	1.9	2.15	2.05
4	3.95	2.7	5.05	5.15	5.65	2.6	2.1	1.85	1.8	1.7	2.05	1.95
5	3.65	3.05	4.3	4.75	4.9	2.5	2.05	1.9	1.75	1.9	2.05	1.85
6	2.75	2.8	3.65	4.75	4.15	2.5	2.1	1.85	1.6	1.9	2.1	1.85
7	2.9	2.85	3.75	5.2	5.15	2.4	2.2	1.8	1.8	1.9	2.1	2.05
8	3.1	2.85	3.45	4.85	7.9	2.35	2.1	1.85	1.8	1.9	1.95	2.05
9	3.45	3.05	3.15	7.45	8.15	2.2	2.1	1.8	1.85	1.95	2.05	2.05
10	3.45	2.8	3.05	6.95	7.75	2.3	2.05	1.8	1.8	2.0	2.05	2.25
11	3.1	3.1	2.95	6.15	6.55	2.2	1.9	1.85	1.65	1.8	2.1	2.2
12	3.05	2.65	3.45	5.45	5.8	2.4	1.95	1.8	1.6	1.95	2.05	2.1
13	4.55	2.6	5.15	4.9	4.85	2.3	1.95	1.8	1.55	1.9	2.15	2.05
14	4.6	2.55	10.05	4.6	4.5	2.3	2.0	1.8	1.7	1.85	2.15	2.15
15	3.95	9.55	11.55	4.35	5.3	2.3	2.0	1.8	1.65	1.8	2.15	2.25
16	3.55	13.65	12.15	5.7	5.05	2.3	1.95	1.8	1.7	1.8	2.15	2.15
17	3.05	12.4	9.75	5.05	4.55	2.25	1.9	1.85	1.65	1.7	2.1	2.25
18	3.0	8.05	6.95	4.45	4.0	2.2	1.95	1.9	1.65	1.7	2.1	2.15
19	2.95	5.95	6.85	4.65	3.7	2.25	1.9	1.85	1.6	1.9	2.05	2.15
20	2.95	4.85	5.75	5.65	3.35	2.25	1.9	1.8	1.5	1.8	2.1	2.1
21	2.75	4.4	5.05	5.4	3.25	2.2	1.9	1.8	1.7	1.95	2.15	2.3
22	2.85	4.05	4.75	4.75	3.25	2.2	1.9	1.8	1.65	1.8	2.1	2.15
23	2.85	3.75	4.95	4.45	3.15	2.2	1.95	1.75	1.8	1.9	2.15	2.25
24	3.0	3.4	7.1	4.15	3.45	2.1	2.05	1.75	1.65	1.9	2.15	2.05
25	2.8	3.35	8.65	3.85	3.3	2.2	2.75	1.8	1.7	1.65	2.05	2.1
26	2.7	3.25	7.6	3.65	3.05	2.2	2.35	1.8	1.7	1.85	2.05	2.15
27	2.75	3.6	8.85	3.55	2.9	2.15	2.2	1.8	1.55	1.85	2.1	2.2
28	2.95	3.85	10.3	3.9	2.8	2.1	2.05	1.8	1.75	2.05	2.05	2.05
29	2.75	3.45	11.85	3.75	2.7	2.05	2.1	1.8	1.9	2.15	2.0	2.05
30	2.85	.....	10.85	3.65	2.65	2.05	2.0	1.65	1.85	2.1	2.05	2.0
31	2.45	.....	8.35	.....	2.75	.....	2.0	1.8	.....	2.25	.....	2.1

[a] Ice conditions at this station largely in the form of anchor ice obstruction. Portions of January to March and December, 1907, liable to error from this cause. The river was frozen part way across below the gaging station. It seldom freezes over at the gage.

[b] Discharge affected by ice conditions February 1 to 14 and during the greater portion of December, 1908. It may also have been slightly affected during the last week of January, 1908.

Rating table for Susquehanna River at Binghamton, N. Y., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	45	3.00	3,070	4.50	6,920	7.00	14,600
1.60	115	3.10	3,320	4.60	7,190	7.20	15,260
1.70	210	3.20	3,570	4.70	7,460	7.40	15,920
1.80	335	3.30	3,820	4.80	7,730	7.60	16,590
1.90	500	3.40	4,070	4.90	8,000	7.80	17,270
2.00	700	3.50	4,320	5.00	8,280	8.00	17,950
2.10	920	3.60	4,570	5.20	8,880	9.00	21,500
2.20	1,150	3.70	4,820	5.40	9,495	10.00	25,100
2.30	1,380	3.80	5,080	5.60	10,120	11.00	28,700
2.40	1,610	3.90	5,340	5.80	10,760	12.00	32,300
2.50	1,850	4.00	5,600	6.00	11,400	13.00	35,950
2.60	2,090	4.10	5,860	6.20	12,040	14.00	39,720
2.70	2,330	4.20	6,120	6.40	12,680		
2.80	2,570	4.30	6,380	6.60	13,320		
2.90	2,820	4.40	6,650	6.80	13,960		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made during 1901–1908, and is well defined below gage height 6 feet. Above gage height 6 feet the rating curve is based on one measurement at gage height 16.33 feet.

Monthly discharge of Susquehanna River at Binghamton, N. Y., for 1907–8.

[Drainage area, 2,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.[a]						
January	24,000	2,570	8,740	3.64	4.20	B.
February	4,320	1,150	1,840	.769	.80	C.
March	21,300	810	7,840	3.27	3.77	A.
April	17,800	2,940	6,210	2.59	2.89	A.
May	11,200	1,730	4,530	1.89	2.18	A.
June	2,820	700	1,360	.567	.63	A.
July	2,210	700	1,440	.606	.69	A.
August	1,040	115	523	.218	.25	B.
September	9,500	272	2,180	.908	1.01	A.
October	14,300	1,850	5,230	2.18	2.51	A.
November	24,400	2,700	7,080	2.95	3.29	A.
December	34,300	1,730	10,500	4.38	5.05	B.
The year	34,300	115	4,790	2.00	27.27	
1908.[b]						
January	10,800	1,730	3,990	1.66	1.91	A.
February	38,400	.....	6,830	2.85	3.07	B.
March	32,800	2,940	13,500	5.62	6.48	A.
April	16,100	4,440	8,480	3.53	3.94	A.
May	18,500	2,210	7,510	3.13	3.61	A.
June	3,200	810	1,450	.604	.67	A.
July	2,450	500	820	.342	.39	A.
August	700	162	374	.156	.18	B.
September	500	45	243	.101	.11	B.
October	1,260	162	505	.210	.24	B.
November	1,260	600	909	.379	.42	A.
December	.....	.....	500	.208	.24	C.
The year	38,400	45	3,760	1.57	21.26	

[a] Discharge February, 1907, has been corrected 10 per cent account of probable back-water effect from ice. Portions of January, March, and December, 1907, were also probably more or less affected. The mean for the month, however, is probably not affected more than a few per cent from this cause and hence no correction has been attempted. Discharge March 31, 1907, interpolated.

[b] Discharge during frozen periods estimated on the basis of the discharge of adjacent areas. It is only roughly approximate. Discharge February 1 to 14, 1908, 1,600 second-feet.

SUSQUEHANNA RIVER AT WYSOX, PA.

This station was established September 2, 1908, by Messrs. Meikleham and Dinsmore, through whose courtesy the records of discharge given below are published. It is located about one-half mile from

Wysox station on the Lehigh Valley Railroad and is just above the junction with Lanning Creek. The bridge spans both Lanning Creek and Susquehanna River, but a point of land separates them for all stages below about 7 feet.

The datum of the steel tape gage is 682.36 feet above sea level. Conditions of flow are probably permanent. Measuring conditions are good except for extreme low stages when the current is very sluggish. Low water measurements are made at a riffle seven-tenths of a mile above the bridge. A good rating curve has been developed.

Discharge measurements of Susquehanna River at Wysox, Pa., in 1908–9.

Date.	Width.	Area of section.	Gage height.	Discharge
1908.	*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
September 3 [a]	194	452	2.30	708
September 22 [a]	190	394	2.08	465
1909.				
April 24	669	5,630	5.75	13,800
May 4	758	8,470	9.38	37,600
June 4	642	4,000	3.40	3,290

[a] Measurements made at riffle 0.7 mile above bridge.

Daily gage height, in feet, and daily discharge, in second-feet, of Susquehanna River at Wysox, Pa., for 1908.

Day.	September.		October.		November.		December.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			2.24	690	2.71	1,800	2.58	1,470
2	2.30	800	2.26	760	2.72	1,860	2.56	1,430
3	2.28	780	2.32	810	2.70	1,850	2.55	1,420
4	2.25	700	2.30	800	2.70	1,850	2.53	1,400
5	2.20	650	2.30	800	2.64	1,690	2.56	1,430
6	2.22	665	2.28	780	2.60	1,500	2.40	1,100
7	2.20	650	2.26	760	2.58	1,470	2.42	1,200
8	2.22	665	2.26	760	2.53	1,400	2.26	760
9	2.19	648	2.25	700	2.52	1,390	2.55	1,420
10	2.24	690	2.26	760	2.55	1,420	2.25	700
11	2.24	690	2.40	1,100	2.53	1,400	2.49	1,290
12	2.24	690	2.46	1,200	2.55	1,420	2.78	2,000
13	2.20	650	2.32	850	2.55	1,420	2.68	1,700
14	2.24	690	2.34	1,000	2.50	1,300	2.70	1,750
15	2.14	600	2.36	1,050	2.78	2,000	2.72	1,860
16	2.12	550	2.34	1,000	2.70	1,850	2.71	1,800
17	2.11	545	2.32	850	2.67	1,690	2.72	1,860
18	2.11	545	2.30	800	2.68	1,700	2.52	1,390
19	2.10	540	2.28	780	2.63	1,560	2.66	1,590
20	2.10	540	2.28	780	2.62	1,550	2.80	2,150
21	2.10	540	2.28	780	2.62	1,550	2.66	1,590
22	2.08	530	2.27	770	2.62	1,550	2.64	1,570
23	2.08	530	2.25	700	2.68	1,700	2.88	2,100
24	2.08	530	2.25	700	2.68	1,700	2.74	1,880
25	2.10	540	2.28	780	2.70	1,850	2.85	2,250
26	2.08	530	2.29	790	2.67	1,690	2.76	1,950
27	2.08	530	2.35	1,025	2.60	1,500	2.46	1,260
28	2.07	525	2.45	1,190	2.60	1,500	2.48	1,280
29	2.14	600	2.70	1,750	2.59	1,490	2.56	1,430
30	2.17	635	2.72	1,860	2.60	1,500	2.54	1,410
31			2.68	1,700			2.75	1,890

Monthly discharge of Susquehanna River at Wysox, Pa., for 1908.

[Drainage area, 7,930 square miles.]

Month.	Discharge in second-feet.				Run-off, (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
September	850	525	621	0.078	0.09
October	1,860	700	938	.118	.14
November	2,000	1,300	1,600	.202	.23
December	2,250	700	1,560	.197	.23

NOTE.—The discharge for September 1 was estimated at 850 second-feet by the United States Geological Survey to complete the month. The discharge for December is probably too high on account of effect of ice conditions.

SUSQUEHANNA RIVER AT WILKESBARRE, PA.

This station is located at the Market Street Bridge, Wilkesbarre. No important tributaries enter Susquehanna River for several miles above or below the station. It was originally established by the United States Geological Survey March 30, 1899. The United States Weather Bureau has also maintained gage heights records at this point since 1888. The datum of the United States Geological Survey gage was placed 4.00 feet below the datum of the Weather Bureau gage to obviate negative readings and was soon after adopted by the Weather Bureau. Since April 1, 1905, when the Geological Survey discontinued reading the gage, the gage heights have been furnished by the Weather Bureau. The records of stage at this station are utilized by the Weather Bureau for the purpose of flood predictions. The United States Geological Survey determinations of the regimen of flow are of value for navigation and power purposes.

The datum of the United States Geological Survey gage has remained constant since the establishment in 1899. Records obtained by the Weather Bureau prior to the adoption of the Geological Survey gage will have to have 4.00 feet added to reduce them to the present datum.

The discharge at this point is frequently affected by ice during the winter period, and water is often backed up many feet by ice gorges. Conditions of flow are subject to change at irregular intervals. A fairly good rating curve has been developed.

Discharge data for this station prior to 1905 have been revised and republished in Water-Supply Paper 109.

Discharge measurements of Susquehanna River at Wilkesbarre, Pa., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 16	R. H. Bolster	591	5,020	5.99	11,200
1908.					
October 29	K. C. Grant	400	3,000	2.70	1,660

Daily gage height, in feet, of Susquehanna River at Wilkesbarre, Pa., for 1907–8.

[Obadiah Henstreet, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	13.5	9.4	3.7	9.8	9.3	4.6	3.8	3.2	2.2	3.8	7.7	5.7
2	15.4	9.2	3.8	8.7	9.6	4.5	3.9	3.1	2.2	3.8	6.7	5.6
3	13.5	9.2	3.8	7.7	9.7	4.7	5.2	3.0	2.2	4.4	7.4	5.4
4	11.3	8.3	3.8	7.0	8.8	4.9	4.8	2.9	2.3	4.4	9.2	5.2
5	12.2	8.0	3.6	6.6	7.9	5.2	4.5	2.9	2.5	5.0	9.8	4.9
6	14.4	7.1	3.8	6.3	7.6	5.0	4.2	2.9	2.8	5.7	8.7	4.8
7	12.5	6.9	3.4	6.1	7.3	4.8	3.9	2.8	2.8	7.1	9.4	4.5
8	10.8	7.0	3.7	6.0	7.1	5.1	3.9	2.9	3.4	6.7	12.1	4.5
9	13.3	7.0	3.3	5.8	8.0	5.1	4.0	2.8	3.8	7.7	14.4	4.7
10	13.7	6.9	3.3	5.7	8.4	5.0	3.9	2.7	3.6	8.8	13.0	6.3
11	11.3	6.6	3.2	6.1	8.1	4.7	3.6	2.7	3.6	9.1	11.3	16.5
12	9.5	6.3	3.1	6.1	7.4	4.4	3.5	2.6	6.7	7.8	9.6	18.5
13	8.5	5.6	3.1	6.7	7.0	4.1	3.5	2.6	7.4	7.0	8.5	15.8
14	8.1	5.2	3.5	6.9	6.6	4.0	4.9	2.5	7.4	7.0	7.7	12.4
15	8.6	5.2	6.0	6.8	6.2	4.0	4.9	2.5	6.0	6.7	7.1	10.4
16	9.8	5.6	16.0	6.8	5.8	3.8	4.8	2.5	5.0	6.1	6.6	9.4
17	8.7	5.6	12.2	6.5	6.0	3.6	4.2	2.5	4.4	5.7	6.1	8.8
18	8.4	5.4	13.5	6.2	5.7	3.5	3.9	2.5	4.0	5.3	5.8	8.4
19	6.6	5.2	13.6	6.1	5.7	3.4	3.6	2.5	4.0	5.0	5.6	7.9
20	7.3	4.8	12.5	6.0	5.5	3.4	3.6	2.4	4.4	4.6	5.5	7.0
21	12.4	5.0	10.9	5.9	5.4	3.5	3.6	2.3	4.0	4.5	5.5	7.0
22	12.5	4.9	9.9	5.7	5.5	3.3	3.6	2.3	3.8	4.5	5.5	6.4
23	9.8	4.6	10.7	5.5	5.2	3.3	3.6	2.2	3.7	4.6	5.4	6.7
24	10.5	4.1	15.1	5.3	4.9	3.4	3.4	2.3	4.1	4.6	5.3	12.4
25	11.3	3.7	14.8	6.7	4.6	3.3	3.3	2.3	4.3	4.5	5.3	18.7
26	10.8	3.7	13.5	10.8	4.5	3.2	3.3	2.3	4.0	4.2	5.1	16.5
27	10.1	3.7	11.7	11.0	4.4	3.4	3.6	2.3	4.0	4.1	5.2	13.6
28	9.9	3.9	10.7	14.6	4.5	3.3	3.4	2.3	3.9	4.3	5.2	11.7
29	9.8	.....	10.8	12.6	5.1	3.2	3.7	2.2	3.9	6.0	5.5	12.5
30	10.1	.....	11.7	10.9	5.3	3.4	3.6	2.2	3.9	8.8	5.7	13.7
31	10.0	.....	11.0	.....	5.0	.....	3.3	2.2	.....	8.8	.....	12.5
1908.[b]												
1	12.0	7.0	6.6	14.9	7.0	5.9	3.0	3.0	2.3	2.2	2.7	2.6
2	9.9	7.9	6.2	12.5	10.2	6.2	2.9	2.9	2.3	2.2	2.5	2.6
3	9.5	6.9	6.0	11.3	11.8	5.9	3.0	2.8	2.2	2.2	2.5	2.5
4	8.4	6.6	6.5	10.5	11.6	5.4	3.3	2.7	2.2	2.2	2.5	2.5
5	7.5	6.3	7.5	9.4	10.3	5.0	3.1	2.6	2.2	2.2	2.5	2.5
6	6.7	6.4	7.6	8.6	9.3	4.6	3.1	2.6	2.2	2.2	2.6	2.4
7	6.1	6.5	7.3	8.0	8.3	4.4	3.1	2.7	2.2	2.2	2.6	2.5
8	5.6	6.3	6.6	8.4	13.9	4.1	3.2	2.7	2.1	2.2	2.6	2.5
9	7.6	6.2	6.8	8.8	15.7	3.9	3.4	2.6	2.1	2.1	2.5	2.3
10	10.1	6.1	6.6	10.3	15.5	3.8	3.0	2.7	2.1	2.1	2.5	2.1
11	10.1	6.0	6.3	11.3	14.5	3.7	2.9	2.6	2.1	2.1	2.4	2.3
12	10.3	6.0	7.0	10.0	12.6	3.6	2.8	2.6	2.1	2.2	2.4	2.5
13	10.8	5.9	10.4	9.0	10.8	3.6	2.8	2.6	2.1	2.2	2.5	2.3
14	9.1	5.9	17.3	8.3	9.4	3.4	2.8	2.6	2.1	2.3	2.5	2.6
15	10.0	7.1	20.6	7.7	8.5	3.5	2.8	2.5	2.1	2.2	2.5	2.6
16	8.5	19.6	21.0	7.7	9.2	3.6	3.0	2.5	2.1	2.2	2.6	2.6
17	7.1	21.8	20.9	8.1	9.9	3.4	2.8	2.5	2.0	2.2	2.7	2.6
18	7.0	17.6	16.9	8.7	9.3	3.4	2.8	2.5	2.0	2.2	2.7	2.7
19	6.1	14.0	14.9	8.1	8.3	3.4	2.8	2.5	2.0	2.2	2.7	2.3
20	5.8	10.9	16.1	8.9	7.4	3.4	2.7	2.5	2.0	2.2	2.6	2.4
21	5.6	9.0	13.0	10.8	6.9	3.3	2.7	2.5	2.0	2.2	2.6	2.6
22	5.5	8.2	11.0	10.4	6.6	3.2	2.7	2.6	2.0	2.1	2.6	2.6
23	5.5	7.4	10.3	9.3	6.8	3.2	2.8	2.5	2.0	2.1	2.6	2.3
24	6.0	7.0	10.4	8.4	6.5	3.1	2.9	2.5	2.0	2.1	2.6	2.2
25	5.8	6.3	12.8	7.7	6.2	3.2	3.5	2.5	2.0	2.1	2.6	2.7
26	5.5	6.2	14.9	7.2	6.1	3.3	4.3	2.5	2.0	2.1	2.6	2.8
27	5.5	7.8	14.0	6.8	5.7	3.4	5.7	2.8	2.0	2.5	2.7	2.6
28	8.1	8.0	15.6	6.7	5.4	3.1	4.5	2.3	2.0	2.5	2.7	2.4
29	9.4	7.2	17.7	6.6	5.5	3.2	3.8	2.3	2.4	2.7	2.6	2.5
30	9.9	.....	19.8	6.8	5.4	3.1	3.4	2.3	2.2	2.9	2.6	2.4
31	8.5	.....	18.0	.....	5.2	.....	3.2	2.3	.....	2.9	.....	2.7

[a] Ice conditions prevailed from about January 24 to February 25 and February 28, 1907.

[b] Discharge affected by ice conditions January 9 to 16 and January 28 to February 14, 1908. It is probable that December was not much affected by ice conditions. October and November gage heights were probably in error. See footnote to monthly discharge table.

Rating table for Susquehanna River at Wilkesbarre, Pa., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.00	760	3.50	3,270	5.00	7,600	8.00	19,600
2.10	860	3.60	3,500	5.20	8,300	9.00	24,350
2.20	970	3.70	3,740	5.40	9,000	10.00	29,350
2.30	1,090	3.80	3,990	5.60	9,720	11.00	34,600
2.40	1,220	3.90	4,250	5.80	10,460	12.00	40,200
2.50	1,360	4.00	4,520	6.00	11,200	13.00	46,050
2.60	1,510	4.10	4,790	6.20	11,970	14.00	52,250
2.70	1,660	4.20	5,070	6.40	12,750	15.00	58,700
2.80	1,820	4.30	5,360	6.60	13,550	16.00	65,500
2.90	2,000	4.40	5,660	6.80	14,370	17.00	72,800
3.00	2,190	4.50	5,970	7.00	15,200	18.00	80,500
3.10	2,390	4.60	6,280	7.20	16,050	19.00	88,600
3.20	2,600	4.70	6,600	7.40	16,910	20.00	97,100
3.30	2,820	4.80	6,930	7.60	17,790	21.00	106,000
3.40	3,040	4.90	7,260	7.80	18,690	22.00	115,300

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1899–1908 and is well defined.

Monthly discharge of Susquehanna River at Wilkesbarre, Pa., for 1907–8.

[Drainage area, 9,810 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	61,400	.....	29,500	3.01	3.47	B.
February	.....	.....	5,350	.545	.57	B.
March	65,500	2,390	24,100	2.46	2.84	A.
April	56,100	8,650	17,900	1.82	2.03	A.
May	27,800	5,660	13,700	1.40	1.61	A.
June	8,300	2,600	4,810	.490	.55	B.
July	8,300	2,820	4,370	.445	.51	B.
August	2,600	970	1,490	.152	.18	A.
September	16,900	970	5,140	.524	.58	B.
October	24,800	3,990	11,100	1.13	1.30	A.
November	54,800	7,950	18,600	1.90	2.12	A.
December	86,100	5,970	30,400	3.10	3.57	A.
The year	86,100	970	13,900	1.41	19.33	
1908.						
January	40,200	.....	14,100	1.44	1.66	B.
February	113,000	.....	21,600	2.20	2.37	B.
March	106,000	11,200	45,200	4.61	5.32	A.
April	58,000	13,600	25,000	2.55	2.84	A.
May	63,400	8,300	25,800	2.63	3.03	A.
June	12,000	2,390	4,470	.456	.51	B.
July	10,100	1,660	2,720	.277	.32	B.
August	2,190	1,090	1,480	.151	.17	B.
September	1,220	760	869	.089	.10	B.
October	.....	.....	1,270	.129	.15	B.
November	.....	.....	1,850	.189	.21	B.
December	1,820	860	1,360	.139	.16	B.
The year	113,000	760	12,100	1.24	16.84	

NOTE.—Discharge during the frozen periods, 1907, based on comparisons with Susquehanna River at Danville. With the exception of a few days during the latter part of February and the first of March the station at Danville was not much affected by ice conditions. Further comparisons of Wilkesbarre with stations in this drainage in the State of New York show that the above values are very close for January, February, and March.

	Second-feet.
Discharge January 24 to 31, 1907	12,800

Discharge during the frozen periods, 1908, estimated on the basis of intercomparisons with the discharge at other points in this drainage and climatological reports. Comparisons of discharge for October and November, 1908, made it evident that the gage readings for these two months were probably in error. The monthly means were accordingly corrected to the values given above.

	Second-feet.
Discharge January 9 to 16, 1908	14,300
January 28 to 31, 1908	7,500
February 1 to 14, 1908	6,000

SUSQUEHANNA RIVER AT DANVILLE, PA.

This station is located at Mill Street Bridge in Danville. It is 52 miles below Wilkesbarre and 11 miles above the mouth of West Branch of Susquehanna River. There are no important tributaries within several miles of the station. It was established March 25, 1899, by the United States Geological Survey. It is now being maintained by the Pennsylvania state water-supply commission, from whom the tables of daily gage heights and discharge measurements made by engineers of the commission are obtained.

The Susquehanna at this point is paralleled on the north side by the Pennsylvania Canal.

On March 9, 1904, the bridge and gage were carried away in an ice freshet, and from that date until March 24, 1905, after the new steel bridge was completed, observations were made from temporary gages and were constantly liable to error for stages less than 5 feet. With the exception of this period the datum of the chain gage has remained constant during the period of maintenance of the station.

The discharge during the winter is considerably affected by ice. Conditions of flow at this point are permanent and an excellent rating curve has been developed.

Discharge data for this station prior to 1905 have been revised and republished in Water-Supply Paper 109.

Discharge measurements of Susquehanna River at Danville, Pa., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 15	Bolster and Grant	980	4,460	5.67	14,700
1908.					
September 15	F. E. Langenheim	872	1,460	1.74	981

Daily gage height, in feet, of Susquehanna River at Danville, Pa., for 1907–8.

[Ed. F. Bell, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	10.6	4.6	.....	8.7	8.0	4.1	3.8	3.1	2.0	3.6	6.8	4.8
2	12.5	4.5	.....	7.5	7.2	4.3	3.6	2.9	1.9	3.4	6.0	4.8
3	11.45	4.3	.....	6.7	7.8	4.5	3.9	2.9	2.0	3.5	7.2	4.6
4	10.2	4.1	.....	6.0	7.4	4.4	4.4	2.8	2.0	3.6	8.4	4.6
5	9.3	4.0	.....	5.6	6.8	4.5	4.0	2.7	2.2	4.0	7.6	4.3
6	11.55	3.9	.....	5.4	6.1	4.6	3.9	2.6	2.3	4.4	7.1	4.3
7	10.6	3.7	.....	5.3	6.0	4.4	4.2	2.5	2.4	5.3	8.9	4.2
8	9.4	3.7	.....	5.2	5.9	4.3	3.6	2.5	2.6	5.7	9.8	4.2
9	10.6	3.5	.....	4.9	5.8	4.3	3.9	2.4	2.7	6.0	11.6	3.9
10	10.0	3.5	3.8	4.9	6.8	4.3	3.7	2.6	3.5	6.5	10.9	4.9
11	9.6	3.5	3.9	4.9	6.9	4.2	3.5	2.4	4.2	7.6	9.0	14.8
12	8.5	3.4	4.2	5.1	6.1	4.1	3.5	2.5	4.8	6.9	8.2	15.3
13	7.8	3.4	4.4	5.3	5.9	3.8	3.4	2.3	5.8	6.1	7.0	12.4
14	7.0	3.2	5.6	5.3	5.6	3.7	3.6	2.4	6.4	5.8	6.7	11.6
15	6.6	3.3	6.2	5.6	5.3	3.7	4.3	2.4	5.7	5.7	6.0	10.2
16	7.7	3.2	8.55	5.6	5.3	3.6	4.2	2.3	4.9	5.4	5.6	7.8
17	7.0	3.2	10.2	5.5	5.1	3.3	3.9	2.2	4.1	4.9	5.3	7.4
18	6.6	3.2	11.7	5.3	4.9	3.3	3.7	2.3	3.8	4.6	5.0	6.9
19	6.0	3.1	11.25	5.0	4.9	3.2	3.6	2.1	3.5	4.3	4.8	6.5
20	5.7	3.3	10.6	5.0	4.7	3.1	3.3	2.2	3.6	4.1	4.7	6.2
21	8.5	3.3	10.1	4.9	4.5	3.2	3.4	2.1	3.8	3.9	4.6	5.9
22	10.5	3.5	9.1	4.8	4.6	3.2	3.3	2.1	3.6	3.8	4.6	5.4
23	9.05	.....	8.6	4.8	4.6	3.0	3.2	2.0	3.7	3.8	4.6	5.7
24	6.9	.....	11.2	4.6	4.2	3.1	3.3	2.2	3.7	3.9	4.5	8.6
25	6.0	.....	12.3	4.6	4.1	3.1	3.1	2.3	4.0	3.9	4.4	14.4
26	5.7	.....	11.5	8.4	4.0	3.0	3.0	2.3	4.0	3.7	4.4	14.0
27	5.0	.....	10.1	8.1	3.8	3.1	3.0	2.1	3.6	3.7	4.3	11.6
28	4.4	.....	9.0	11.1	3.8	3.1	3.0	2.2	3.6	4.1	4.5	9.2
29	4.5	.....	8.5	10.15	3.9	2.9	2.9	2.0	3.5	4.6	4.6	9.1
30	4.4	.....	8.9	9.3	4.4	3.2	3.3	2.1	3.6	5.8	4.6	10.6
31	4.5	.....	9.2	.....	4.4	.....	3.2	2.0	.....	7.6	.....	10.3
1908.[b]												
1	9.6	4.2	6.3	12.7	6.4	4.7	2.6	2.7	1.95	2.05	2.5	2.2
2	8.9	.....	5.6	10.7	6.7	5.1	2.5	2.6	1.95	1.95	2.4	2.1
3	7.7	.....	5.4	9.5	9.2	5.0	3.3	2.4	1.85	1.85	2.4	2.2
4	7.0	.....	5.1	9.1	9.6	4.8	3.1	2.5	1.85	1.95	2.3	2.1
5	6.8	.....	6.1	8.0	8.6	4.4	2.9	2.3	1.85	1.85	2.3	2.1
6	5.8	.....	6.2	7.2	7.7	4.1	2.9	2.4	1.85	1.85	2.2	2.0
7	5.7	.....	6.1	7.0	8.1	4.0	2.9	2.3	1.85	1.85	2.3	2.1
8	5.4	.....	6.0	7.0	11.6	3.6	2.7	2.4	1.75	1.85	2.2	2.0
9	4.9	.....	6.0	6.8	12.5	3.5	2.7	2.3	1.75	1.85	2.3	2.2
10	4.5	.....	5.8	7.1	12.9	3.4	2.9	2.3	1.75	1.85	2.1	2.1
11	4.2	.....	5.7	7.9	12.1	3.2	2.6	2.2	1.75	1.85	2.2	2.3
12	5.3	.....	6.6	7.6	11.1	3.2	2.6	2.3	1.75	1.95	2.1	2.3
13	6.4	.....	7.4	6.9	9.6	3.1	2.6	2.2	1.75	1.85	2.2	2.4
14	6.8	.....	12.3	6.7	8.8	3.0	2.4	2.3	1.75	1.85	2.1	2.3
15	7.5	10.5	16.1	6.4	8.1	3.1	2.5	2.2	1.75	1.95	2.3	2.4
16	6.4	15.9	16.8	6.2	8.5	3.2	2.3	2.2	1.75	1.85	2.2	2.2
17	6.0	17.0	15.5	6.2	8.6	3.0	2.6	2.1	1.75	1.85	2.2	2.3
18	5.7	14.4	14.6	7.8	8.0	3.0	2.4	2.2	1.75	1.85	2.2	2.4
19	5.3	11.7	13.5	7.7	7.5	3.0	2.5	2.2	1.65	1.85	2.4	2.8
20	5.0	10.0	14.1	7.6	6.9	2.8	2.4	2.2	1.65	1.85	2.3	2.7
21	4.9	7.6	12.2	7.7	6.1	2.9	2.4	2.1	1.65	1.85	2.3	2.9
22	4.7	6.8	10.6	8.4	5.9	2.8	2.7	2.2	1.65	1.85	2.2	2.9
23	4.6	6.0	9.8	7.6	5.7	2.7	2.6	2.2	1.65	1.75	2.3	3.4
24	4.7	5.7	8.4	6.9	5.6	2.8	2.5	2.3	1.65	1.75	2.2	3.6
25	4.6	5.4	9.6	6.6	5.5	2.8	2.9	2.1	1.65	1.85	2.2	3.3
26	4.4	6.6	11.8	6.0	5.1	2.8	3.1	2.2	1.65	2.0	2.1	3.2
27	4.1	7.2	11.3	5.6	4.9	2.9	3.6	2.2	1.65	2.1	2.3	3.2
28	4.2	7.2	11.3	5.8	4.9	2.8	4.2	2.2	1.65	2.3	2.2	3.0
29	3.9	6.5	13.3	5.8	4.6	2.7	3.9	2.0	1.75	2.3	2.2	2.8
30	4.4	.....	15.3	5.5	4.6	2.7	3.1	1.95	2.05	2.5	2.1	2.7
31	4.1	.....	15.2	.....	4.7	.....	3.0	1.95	.....	2.4	.....	2.7

[a] Ice conditions prevailed from about February 20 to March 15, 1907.
[b] Ice conditions prevailed from about January 30 to February 15 and December 9 to 31, 1908.

Rating table for Susquehanna River at Danville, Pa., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	790	3.10	4,480	4.60	11,000	7.20	25,720
1.70	920	3.20	4,840	4.70	11,500	7.40	26,960
1.80	1,070	3.30	5,220	4.80	12,020	7.60	28,260
1.90	1,240	3.40	5,600	4.90	12,540	7.80	29,580
2.00	1,420	3.50	6,000	5.00	13,060	8.00	30,940
2.10	1,620	3.60	6,400	5.20	14,150	9.00	38,200
2.20	1,830	3.70	6,800	5.40	15,250	10.00	46,220
2.30	2,060	3.80	7,220	5.60	16,350	11.00	54,920
2.40	2,300	3.90	7,660	5.80	17,450	12.00	64,320
2.50	2,560	4.00	8,100	6.00	18,550	13.00	74,420
2.60	2,840	4.10	8,560	6.20	19,710	14.00	85,120
2.70	3,140	4.20	9,040	6.40	20,900	15.00	96,420
2.80	3,460	4.30	9,520	6.60	22,100	16.00	108,520
2.90	3,780	4.40	10,000	6.80	23,300	17.00	121,620
3.00	4,120	4.50	10,500	7.00	24,500		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1899–1908, and is well defined.

Monthly discharge of Susquehanna River at Danville, Pa., for 1907–8.

[Drainage area, 11,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	69,300	10,000	32,900	2.96	3.41	A.
February	11,000	.....	5,860	.528	.55	B.
March	67,300	.....	26,300	2.37	2.73	B.
April	55,800	11,000	20,100	1.81	2.02	A.
May	30,900	7,220	15,800	1.42	1.64	A.
June	11,000	3,780	6,920	.623	.70	B.
July	10,000	3,780	6,360	.573	.66	B.
August	4,480	1,420	2,300	.207	.24	B.
September	20,900	1,240	6,970	.628	.70	A.
October	28,300	5,600	12,700	1.14	1.31	A.
November	60,500	9,520	22,000	1.98	2.21	A.
December	99,900	7,660	35,300	3.18	3.67	A.
The year	99,900	1,240	16,100	1.45	19.84	
1908.						
January	42,900	.....	16,700	1.50	1.73	A.
February	122,000	.....	25,900	2.33	2.51	B.
March	119,000	13,600	51,400	4.63	5.34	A.
April	71,300	15,800	27,800	2.50	2.79	A.
May	78,400	11,000	31,200	2.81	3.24	A.
June	13,600	3,140	5,750	.518	.58	A.
July	9,040	2,060	3,640	.328	.38	A.
August	3,140	1,330	1,960	.177	.20	B.
September	1,520	855	1,020	.092	.10	B.
October	2,560	995	1,350	.122	.14	B.
November	2,560	1,620	1,940	.175	.20	B.
December	.....	.....	1,600	.144	.17	B.
The year	122,000	855	14,200	1.28	17.38	

NOTE.—Discharge during the frozen periods estimated on the basis of intercomparison with Susquehanna River at Wilkes-Barre and climatological reports.

	Second-feet.
Discharge February 20 to 28, 1907	4,100
March 1 to 15, 1907	4,030
January 30 to 31, 1908	7,500
February 1 to 14, 1908	7,000
February 15, 1908	30,000
December 9 to 31, 1908	1,590

SUSQUEHANNA RIVER AT HARRISBURG, PA.

This station is located at the Walnut Street Bridge at Harrisburg. Daily observations of stage were begun at Harrisburg in 1890 by E. Mather, president of the Harrisburg water board. The original gage is located in the pump well at the pump house of the city waterworks, the well being connected with the river by two large mains. On July 18, 1904, a chain gage was installed on the Walnut Street Bridge. The readings are now furnished by the United States Weather Bureau, which has maintained the station since July 15, 1906.

The records of discharge at this station are of value in connection with power development and navigation problems.

The river is divided into two channels at this point by Foster Island, which is overflowed at times of flood.

Conodoguinet Creek enters Susquehanna River from the west about 2 miles above the gaging station. Paxton Creek enters from the northeast, about 1½ miles below the station. The Pennsylvania Canal parallels the river on the left side.

The datums of both gages have remained constant since their establishment. For full information regarding the two gages, changes in conditions of flow, etc., see Water-Supply Papers Nos. 109 and 167. The discharge at this point is affected by ice. Conditions of flow here have been relatively permanent during the past few years, and a good rating curve has been developed.

Discharge data for this station prior to 1905 have been revised and republished in Water-Supply Paper 109.

Discharge measurements of Susquehanna River at Harrisburg, Pa., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 22	A. H. Horton	2,340	8,800	1.95	12,400
October 10	R. H. Bolster	2,540	13,700	3.60	32,900
1908.					
March 17	C. E. Ryder	2,690	42,400	14.63	264,000
September 12	Grant and Reckord	2,320	5,600	.30	3,220

Daily gage height, in feet, of Susquehanna River at Harrisburg, Pa., for 1907-8.

[E. R. Demain, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	6.6	3.2	3.3	6.0	5.6	2.5	2.4	1.5	0.6	2.0	4.2	3.0
2	9.9	3.2	3.3	5.4	4.9	2.6	2.9	1.4	.5	2.0	3.7	2.9
3	9.3	3.1	3.5	4.9	4.7	3.3	3.5	1.3	.6	2.0	4.0	2.9
4	7.9	3.0	3.6	4.4	4.8	4.6	3.7	1.2	.6	1.9	5.1	2.8
5	7.0	2.9	3.4	4.1	4.5	4.5	3.3	1.1	.8	2.0	5.4	2.5
6	6.9	2.7	3.4	3.8	4.2	4.2	3.0	1.1	1.4	2.2	5.5	2.5
7	7.5	3.1	3.5	3.6	4.0	4.1	2.8	1.1	1.1	2.5	4.9	2.4
8	6.7	5.8	3.4	3.5	4.0	4.0	2.8	1.0	1.2	2.9	4.8	2.3
9	5.9	5.8	3.4	3.5	4.0	3.7	2.6	1.0	1.2	3.3	5.9	2.2
10	7.0	5.9	3.6	4.0	4.4	3.4	2.5	1.3	1.6	3.4	6.8	2.8
11	7.2	5.9	3.5	4.0	5.5	3.3	2.4	1.2	2.7	3.7	6.1	9.9
12	6.4	5.9	3.4	3.9	5.3	3.1	2.3	1.1	4.0	4.0	5.4	10.7
13	5.9	5.3	3.5	3.8	4.8	3.0	2.1	1.1	4.1	3.6	4.7	10.0
14	6.2	5.3	6.1	3.7	4.4	3.1	2.0	1.0	3.6	3.2	4.2	8.3
15	6.8	5.2	11.5	3.6	4.1	2.9	1.9	.8	3.4	3.1	3.8	7.0
16	7.3	4.9	13.3	3.7	3.9	3.6	2.1	.9	3.1	2.9	3.5	6.0
17	7.3	5.0	11.0	3.5	3.7	3.2	2.2	.8	2.6	2.7	3.2	5.3
18	6.5	5.1	10.2	3.5	3.5	2.9	2.2	.8	2.3	2.5	3.0	4.9
19	5.7	4.7	10.5	3.4	3.4	2.6	2.0	.7	2.2	2.3	2.9	4.5
20	5.7	4.5	11.0	3.2	3.2	2.4	2.0	.5	1.9	2.3	2.8	4.1
21	6.5	4.5	11.5	3.2	3.1	2.3	2.0	.6	2.0	2.0	2.8	3.9
22	9.1	4.3	10.1	3.1	3.0	2.2	1.9	.6	2.1	1.9	2.7	3.7
23	8.1	3.7	8.6	3.1	2.9	2.2	1.9	.6	2.4	1.8	2.8	3.5
24	6.5	3.3	8.7	3.0	2.8	2.1	1.8	.7	2.5	1.8	2.8	4.6
25	5.3	3.3	9.8	3.2	2.6	2.0	1.6	.7	2.6	1.9	3.0	8.8
26	4.4	3.4	8.9	3.6	2.5	2.4	1.6	.9	2.6	1.8	3.1	10.7
27	4.0	3.3	7.8	5.4	2.5	2.5	1.5	1.0	2.4	1.8	3.0	9.1
28	3.6	3.5	6.9	5.6	2.4	2.4	1.4	.9	2.2	1.9	3.0	7.6
29	3.1	.....	6.4	7.2	2.4	2.3	1.4	.8	2.1	2.0	2.9	6.7
30	3.2	.....	6.3	6.3	2.4	2.2	1.3	.6	1.9	3.3	2.9	7.0
31	3.1	.....	6.5	.....	2.5	.....	1.5	.6	.....	3.9	.....	7.8
1908.[b]												
1	7.5	2.4	4.6	9.8	3.7	5.1	1.4	1.6	0.7	1.0	1.4	0.8
2	6.8	2.6	4.1	8.2	4.4	5.0	1.4	1.4	.6	.7	1.3	.8
3	6.3	1.8	3.9	7.2	5.1	4.7	1.4	1.3	.6	.6	1.2	.6
4	5.5	1.4	4.2	6.6	6.1	4.2	1.4	1.1	.5	.6	1.1	.6
5	4.9	1.7	4.9	6.1	6.0	3.8	1.7	1.1	.5	.6	.9	.5
6	4.5	2.6	5.3	5.5	5.6	3.5	1.7	1.1	.5	.5	.9	.5
7	4.0	2.3	5.4	5.1	5.4	3.2	1.9	1.2	.5	.5	.9	.6
8	3.5	3.0	6.7	4.8	8.6	2.9	1.6	1.2	.4	.4	.9	.4
9	3.3	4.6	8.0	4.7	11.0	2.7	1.5	1.2	.4	.4	.9	.3
10	2.8	3.9	7.8	5.2	10.5	2.6	1.4	1.4	.4	.4	.8	.4
11	2.9	3.8	6.9	5.7	9.6	2.5	1.3	1.2	.4	.6	.8	.8
12	3.1	3.8	7.1	6.2	8.5	2.4	1.3	1.2	.3	.6	.7	.6
13	5.5	3.6	7.7	5.8	7.4	2.3	1.4	1.1	.3	.6	.7	.9
14	7.8	3.6	9.4	5.2	6.4	2.1	1.3	1.1	.3	.6	.7	.4
15	7.5	3.8	12.7	4.8	5.7	2.0	1.3	1.0	.3	.6	.5	.9
16	6.9	12.4	13.9	4.6	6.1	2.0	1.2	.9	.3	.6	.6	1.1
17	5.8	14.4	14.8	4.6	6.9	2.1	1.2	.9	.3	.5	.4	1.0
18	5.2	12.4	13.0	4.7	7.1	2.0	1.2	.9	.3	.5	.7	1.1
19	4.5	9.6	12.7	4.9	6.7	2.0	1.1	.9	.2	.5	.7	.8
20	4.1	7.6	15.9	5.0	8.0	1.8	1.1	.9	.2	.4	.9	1.3
21	3.9	6.3	14.1	5.3	9.7	1.8	1.0	1.0	.2	.4	.8	1.5
22	3.6	5.3	10.4	6.0	8.5	1.7	1.2	1.0	.2	.4	.8	1.6
23	3.5	4.7	8.6	5.7	8.3	1.6	1.4	1.1	.2	.4	.8	1.8
24	3.7	4.3	7.6	5.2	7.6	1.6	1.7	1.0	.2	.4	.8	1.6
25	3.6	3.9	7.4	4.8	7.0	1.6	2.8	1.0	.2	.5	.8	1.6
26	3.4	3.9	8.3	4.4	6.0	1.6	3.1	1.0	.2	.9	.8	1.4
27	3.4	7.1	8.8	4.2	5.3	1.6	3.0	1.0	.2	1.3	.8	1.3
28	3.0	6.2	8.7	4.0	5.5	1.6	2.7	1.0	.2	1.3	.8	1.2
29	3.0	5.2	10.0	4.0	4.9	1.5	2.6	.9	.7	1.6	.8	1.1
30	2.8	.....	11.2	3.8	4.6	1.5	2.2	.8	1.1	1.4	.8	1.3
31	2.4	.....	11.3	.....	4.8	.....	1.9	.7	.....	1.4	.....	1.2

[a] Conditions of flow were affected by ice conditions from February 7 to March 13, 1907.
[b] Conditions of flow were affected by ice conditions from about February 8 to 14, 1908.

Rating table for Susquehanna River at Harrisburg, Pa., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.20	2,870	1.80	11,560	3.40	28,140	6.00	68,400
.30	3,210	1.90	12,340	3.50	29,430	6.20	71,900
.40	3,570	2.00	13,160	3.60	30,800	6.40	75,500
.50	3,960	2.10	14,020	3.70	32,200	6.60	79,200
.60	4,380	2.20	14,910	3.80	33,600	6.80	82,900
.70	4,830	2.30	15,830	3.90	35,000	7.00	86,600
.80	5,310	2.40	16,780	4.00	36,400	8.00	105,600
.90	5,820	2.50	17,770	4.20	39,200	9.00	125,100
1.00	6,360	2.60	18,810	4.40	42,200	10.00	145,600
1.10	6,910	2.70	19,880	4.60	45,400	11.00	167,500
1.20	7,490	2.80	20,990	4.80	48,600	12.00	190,500
1.30	8,100	2.90	22,120	5.00	51,900	13.00	214,200
1.40	8,740	3.00	23,270	5.20	55,100	14.00	238,900
1.50	9,400	3.10	24,450	5.40	58,400	15.00	264,700
1.60	10,090	3.20	25,650	5.60	61,700	16.00	291,500
1.70	10,810	3.30	26,880	5.80	65,000		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1897–1908 and is well defined. This revision of the curve used for 1906 is based on the low-water measurement of 1908, general tendency of recent measurements to give lower discharge than the curve previously used, and an intercomparison of Susquehanna River stations during the low water of 1908.

Monthly discharge of Susquehanna River at Harrisburg, Pa., for 1907–8.

[Drainage area, 24,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	144,000	24,400	76,300	3.18	3.67	A.
February	.....	.....	18,000	.750	.78	C.
March	221,000	.....	82,200	3.42	3.94	A.
April	90,400	23,300	38,900	1.62	1.81	A.
May	61,700	16,800	33,900	1.41	1.63	A.
June	45,400	13,200	23,900	.996	1.11	A.
July	32,200	8,100	15,700	.654	.75	A.
August	9,400	3,960	6,080	.253	.29	A.
September	37,800	3,960	15,300	.638	.71	A.
October	36,400	11.600	18,900	.788	.91	A.
November	82,900	19,900	37,300	1.55	1.73	A.
December	161,000	14,900	65,100	2.71	3.12	A.
The year	221,000	3,960	36,000	1.50	20.45	
1908.						
January	102,000	16,800	45,500	1.90	2.19	A.
February	249,000	8,740	55,500	2.31	2.49	B.
March	289,000	35,000	128,000	5.33	6.14	A.
April	141,000	33,600	59,300	2.47	2.76	A.
May	168,000	32,200	84,600	3.52	4.06	A.
June	53,500	9,400	19,500	.812	.91	A.
July	24,400	6,360	11,000	.458	.53	A.
August	10,100	4,830	6,810	.284	.33	A.
September	6,910	2,870	3,550	.148	.17	A.
October	10,100	3,570	4,920	.205	.24	A.
November	8,740	3,570	5,530	.230	.26	A.
December	11,600	3,210	6,410	.267	.31	A.
The year	289,000	2,870	35,900	1.49	20.39	

NOTE.—During the frozen periods, 1907–8, the discharge was estimated on the basis of intercomparisons of discharge data collected at the various stations in Susquehanna River drainage.

	Second-feet.
Discharge February 7 to 28, 1907	16,500
March 1 to 13, 1907	15,000
February 8 to 14, 1908	12,400

SUSQUEHANNA RIVER NEAR M'CALL FERRY, PA.

The cable from which discharge measurements were made at this station is located about 1 mile above the village of McCall Ferry. It is in a narrow and rocky part of Susquehanna River, about 20 miles above its mouth. The two principal gages to which the measurements are referenced are gage No. 2, about three-fourths of a mile below McCall Ferry, and gage No. 5, about 2 miles below McCall Ferry. This station was established May 17, 1902, by Mr. Boyd Ehle. The gage heights for 1907–8 were furnished by Mr. Cary T. Hutchinson. The station was maintained to determine the discharge of the river for the McCall Ferry power development and to check the accuracy of the records obtained at Harrisburg.

The datum of each gage has remained constant since its establishment. The gage readings give the elevation of the water surface above sea level direct. Gage No. 2, which is located in the tailrace of the power house was used until February 28, 1906, when operations at the dam caused backwater to affect the relation between discharge and gage heights. All readings since then have been referred to gage No. 5, which is located at the foot of Cullys Falls, entirely out of influence of the dam.

The discharge is affected by ice during severe winters. Discharge measurements made at this station have been referenced to both gages. Conditions of flow are permanent, and an excellent rating curve has been developed for each gage.

Discharge data for this station prior to 1905 have been revised and republished in Water-Supply Paper 109.

Daily gage height, in feet, of Susquehanna River near McCall Ferry, Pa., for 1907–8.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	110.0	106.4	102.8	109.5	109.1	103.8	.....	102.5	101.5	103.4	106.5	104.8
2	116.9	106.5	102.8	108.6	108.0	104.0	.....	102.6	101.1	103.2	106.4	104.9
3	115.5	106.6	104.5	107.7	107.0	104.5	.....	102.5	101.4	103.1	106.4	104.7
4	113.3	106.6	104.3	107.1	107.0	106.2	.....	102.3	101.6	103.0	107.7	104.7
5	111.2	105.7	104.0	106.4	106.7	107.1	105.4	102.6	101.5	103.0	108.5	104.3
6	110.8	105.2	104.3	106.0	106.1	106.6	105.0	.....	101.5	.....	108.7	104.1
7	111.7	105.0	104.3	105.7	105.8	106.2	105.0	.....	101.8	103.4	108.3	104.0
8	111.0	104.2	104.2	105.6	104.9	106.0	105.2	.....	101.9	104.0	107.6	103.9
9	109.8	104.6	104.3	105.4	105.8	105.7	104.5	.....	101.9	105.2	108.6	103.6
10	109.7	104.7	104.3	106.1	105.3	105.3	104.4	102.2	102.2	105.3	110.4	104.4
11	111.6	104.7	104.2	106.5	108.0	105.0	104.4	102.2	102.5	105.6	110.0	111.4
12	110.4	105.2	103.8	106.3	108.4	104.9	105.0	102.2	105.3	106.0	109.0	119.9
13	109.8	104.9	104.3	105.6	107.8	104.6	104.5	102.3	107.0	.....	107.8	116.3
14	109.8	104.5	109.4	105.5	106.8	104.5	103.8	102.0	105.8	105.3	106.8	114.3
15	110.9	104.4	121.7	105.3	105.9	104.4	103.3	101.9	.....	104.7	106.2	.....
16	111.9	104.4	121.8	105.3	105.1	104.7	103.5	101.8	105.1	104.5	105.7	110.4
17	111.8	104.4	118.0	105.3	104.8	105.2	103.7	101.8	104.5	104.4	105.4	109.3
18	111.2	104.5	116.6	105.1	104.2	104.7	103.6	101.5	103.9	104.1	104.9	108.4
19	109.5	104.8	116.9	105.7	104.7	104.1	104.0	101.3	103.4	103.7	104.9	107.6
20	109.2	104.6	118.0	104.8	104.3	103.8	103.7	101.7	103.1	.....	104.6	107.1

[a] Gage heights 1907–8 refer to Cullys Falls gage. Conditions of flow probably affected by ice conditions from about January 25 to February 25, 1907. March 3 to 13, 1907, may also have been affected.

Daily gage height, in feet, of Susquehanna River near McCall Ferry, Pa., for 1907–8—Con.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	110.9	104.2	117.8	.....	104.2	103.6	103.5	101.5	103.0	103.3	104.4	106.7
22	113.6	104.5	116.4	104.7	104.0	103.5	103.3	101.4	.....	.....	104.5	106.4
23	113.8	.....	114.8	105.1	103.9	103.5	103.2	101.3	103.6	.....	104.5	106.5
24	111.4	.....	114.0	104.8	103.8	103.4	103.1	101.4	104.6	102.7	105.0	107.9
25	111.1	.....	.....	104.5	103.7	103.4	103.1	101.2	104.5	102.8	106.0	.....
26	112.5	102.9	114.2	105.3	103.5	103.5	103.0	101.2	104.2	102.7	105.6	117.5
27	110.6	102.7	112.2	107.0	103.8	103.8	102.8	101.7	104.0	102.7	105.3	115.3
28	109.0	103.0	111.3	108.2	103.8	103.8	102.5	101.8	103.7	103.0	.....	112.9
29	106.6	.....	110.3	110.8	103.7	103.8	102.4	101.7	.....	103.3	104.9	111.0
30	106.6	.....	109.7	110.2	103.7	.....	102.5	101.7	103.7	104.1	104.8	110.9
31	106.6	.....	109.6	.....	103.7	.....	102.5	101.5	.....	105.6	.....	112.0
1908.[a]												
1	112.1	105.8	108.5	116.2	106.4	107.7	102.2	102.9	101.5	101.3	101.8	101.4
2	113.3	106.5	107.3	114.1	106.5	108.0	102.2	102.5	101.5	101.5	101.8	101.4
3	110.2	106.2	106.8	112.4	107.3	107.6	102.2	102.1	101.4	101.4	101.8	101.2
4	109.2	105.3	107.8	110.9	109.4	106.9	102.2	102.0	101.4	101.2	101.7	101.3
5	108.4	104.4	107.4	110.0	109.6	106.5	102.3	101.9	101.4	100.8	101.6	100.7
6	107.3	104.5	108.5	109.2	109.2	105.9	102.6	101.8	101.1	101.2	101.5	100.4
7	106.7	104.0	108.4	108.1	109.5	105.4	102.7	101.8	100.4	101.2	101.4	100.5
8	106.7	104.0	110.0	107.6	113.9	104.8	102.8	102.0	100.6	101.0	101.3	101.0
9	107.2	.....	112.8	107.4	117.5	104.3	102.4	102.0	100.9	100.7	101.2	101.1
10	105.7	104.0	113.1	107.7	117.2	104.2	102.4	102.0	100.9	100.6	101.2	100.6
11	.....	103.8	111.7	108.5	115.7	104.1	102.0	102.1	100.9	100.5	101.2	100.7
12	.....	103.1	111.0	.....	114.1	104.0	101.7	102.0	100.9	100.3	101.2	101.0
13	111.9	103.5	112.1	109.3	112.5	103.9	101.5	101.9	100.7	101.3	101.0	101.2
14	112.5	103.8	113.7	108.5	110.8	103.4	101.7	101.8	100.5	101.0	100.9	100.3
15	112.6	107.9	119.6	107.5	109.5	103.1	102.2	101.8	100.7	101.0	100.9	101.3
16	111.7	119.9	121.9	107.3	109.1	103.0	102.1	101.7	100.7	100.8	100.9	101.3
17	109.9	123.7	123.0	107.2	111.0	102.9	102.0	101.6	100.4	100.9	100.8	101.5
18	108.9	120.8	121.0	107.2	111.2	102.9	102.0	101.8	100.3	101.0	101.1	101.4
19	107.9	116.3	120.1	.....	111.0	102.9	102.0	101.7	100.7	100.7	101.1	101.4
20	107.1	113.7	124.6	.....	111.0	102.8	101.6	101.6	100.7	101.0	101.3	101.5
21	106.7	110.7	123.0	108.2	116.2	102.7	101.8	101.6	100.3	100.9	101.3	101.2
22	106.4	109.2	118.7	.....	114.4	102.5	102.0	101.7	100.3	100.8	101.3	102.1
23	106.1	108.4	114.5	109.1	114.0	102.5	102.1	101.6	100.6	100.7	101.3	102.3
24	106.2	107.5	112.4	.....	112.6	102.5	102.4	101.7	100.7	.....	101.2	102.3
25	106.0	108.3	111.9	107.0	111.9	102.4	105.4	101.8	100.7	.....	101.1	102.0
26	106.0	109.8	112.7	.....	110.2	102.3	107.0	102.0	100.5	101.8	101.1	101.9
27	106.2	114.0	114.0	106.8	108.8	102.2	106.0	101.9	100.3	102.0	100.7	101.5
28	105.9	111.7	113.5	106.6	108.8	102.1	105.2	101.8	100.2	102.0	100.3	101.5
29	106.1	109.3	115.6	106.5	108.1	102.1	104.1	101.7	100.9	101.9	100.4	101.6
30	106.9	.....	117.4	106.5	107.5	102.1	103.8	101.6	101.1	102.2	100.9	101.5
31	106.9	.....	118.2	.....	107.1	.....	103.3	101.4	.....	.....	.....	101.6

[a] Gage heights 1907–8 refer to Cullys Falls gage. Conditions of flow were probably affected by ice conditions from about January 26 to March 14, 1908.

Rating table for Susquehanna River near McCall Ferry, Pa., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
100.20	2,690	102.00	10,200	103.80	21,840	108.00	57,600
100.30	2,950	102.10	10,760	103.90	22,560	109.00	67,100
100.40	3,230	102.20	11,330	104.00	23,300	110.00	77,000
100.50	3,530	102.30	11,910	104.20	24,800	111.00	88,300
100.60	3,850	102.40	12,500	104.40	26,320	112.00	100,500
100.70	4,190	102.50	13,110	104.60	27,860	113.00	113,700
100.80	4,550	102.60	13,720	104.80	29,420	114.00	127,800
100.90	4,930	102.70	14,350	105.00	31,000	115.00	142,300
101.00	5,330	102.80	14,990	105.20	32,600	116.00	157,000
101.10	5,760	102.90	15,640	105.40	34,240	117.00	172,000
101.20	6,200	103.00	16,300	105.60	35,920	118.00	187,300
101.30	6,650	103.10	16,960	105.80	37,640	119.00	202,900
101.40	7,120	103.20	17,640	106.00	39,400	120.00	218,800
101.50	7,600	103.30	18,320	106.20	41,160	121.00	235,100
101.60	8,090	103.40	19,000	106.40	42,940	122.00	251,800
101.70	8,600	103.50	19,700	106.60	44,740	123.00	268,900
101.80	9,120	103.60	20,400	106.80	46,560	124.00	286,300
101.90	9,650	103.70	21,120	107.00	48,400	125.00	304,000

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is applicable only to the Cullys Falls gage. It is based on 37 discharge measurements made during 1902–1904 and is well defined above gage height 101.2 feet. Below this gage height the curve is uncertain and may be as much as 10 per cent in error at gage height 100.2 feet.

Monthly discharge of Susquehanna River near McCall Ferry, Pa., for 1907–8.

[Drainage area, 26,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	170,000	.....	84,000	3.13	3.61	A.
February	.....	.....	21,700	.810	.84	B.
March	248,000	15,000	93,500	3.49	4.02	A.
April	86,000	27,100	42,500	1.59	1.77	A.
May	68,100	19,700	35,100	1.31	1.51	A.
June	49,300	19,000	28,000	1.04	1.16	A.
July	34,200	12,500	23,100	.862	.99	A.
August	13,700	6,200	9,570	.357	.41	A.
September	48,400	5,760	19,700	.735	.82	A.
October	39,400	14,400	22,800	.851	.98	A.
November	81,400	26,300	44,300	1.65	1.84	A.
December	217,000	20,400	74,600	2.78	3.20	A.
The year	248,000	5,760	41,600	1.55	21.15	
1908.						
January	108,000	.....	56,500	2.11	2.43	A.
February	281,000	.....	70,100	2.61	2.82	A.
March	297,000	46,600	138,000	5.15	5.94	A.
April	160,000	43,800	66,100	2.47	2.76	A.
May	180,000	42,900	92,700	3.46	3.99	A.
June	57,600	10,800	23,900	.892	1.00	A.
July	48,400	7,600	15,600	.582	.67	A.
August	15,600	7,120	9,510	.355	.41	A.
September	7,600	2,690	4,590	.171	.19	A.
October	11,300	2,950	6,250	.233	.27	A.
November	9,120	2,950	6,200	.231	.26	A.
December	11,900	2,950	6,900	.257	.30	A.
The year	297,000	2,690	41,400	1.54	21.04	

NOTE.—Discharge during the frozen periods, 1907–8, estimated on the basis of discharge in adjacent drainages and an intercomparison of the discharge at various points in Susquehanna River drainage. Discharge for days of missing agage heights estimated on the basis of the discharge at Harrisburg for days given below; for all other days discharge interpolated:

	Second-feet.
Discharge January 25 to 31, 1907	44,300
February 1 to 25, 1907	22,400
March 25, 1907	150,000
June 30, 1907	21,000
July 1 to 4, 1907	32,500
August 6 to 9, 1907	10,200
December 15, 1907	100,000
December 25, 1907	130,000
January 11 to 12, 1908	35,000
January 26 to 31, 1908	30,000
February 1 to 14, 1908	18,600
April 12, 1908	85,000
April 22, 1908	82,000

CHENANGO RIVER BASIN.

DESCRIPTION.

Chenango River rises in the central part of Madison County, N. Y., and flows southward into the Susquehanna at Binghamton. It is approximately 70 miles long, and its drainage area comprises about 1,580 square miles. Its headwater valleys lie at an elevation of about 1,200 feet above sea level, and its mouth is 864 feet above tide. Its bed is, as a rule, composed of sand and gravel, and the stream is bordered in many places by bottom lands subject to overflow. A portion of the headwaters are diverted across the Chenango-Mohawk divide through Oriskany Creek to feed the summit level of the Erie Canal.

Considerable power is developed at Binghamton and at Port Dickinson, 3 miles above.

CHENANGO RIVER NEAR GREENE, N. Y.

This temporary station was located at the steel highway bridge about 3 miles above the town of Greene, N. Y. It was established September 5, 1908, to obtain data regarding the low-water flow of the upper Chenango River, and was discontinued November 5, 1908.

Above the station are numerous small tributaries. Eleven miles below the station the river joins Tioughnioga River, at Chenango Forks.

The nearest dams are at Oxford, 12 miles above, and at Greene, 3 miles below the station, but neither has any effect upon the flow at the bridge.

Information regarding this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Chenango River near Greene, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
September 5	C. R. Adams	28	26.6	4.60	53.8
September 30	do	30	43.0	5.00	55.3

Daily gage height, in feet, of Chenango River near Greene, N. Y., for 1908.

[Benjamin Rounds, observer.]

Day.	Sept.	Oct.	Nov.	Day.	Sept.	Oct.	Nov.	Day.	Sept.	Oct.	Nov.
1	.....	5.0	5.4	11	4.7	5.2	.....	21	4.5	4.9	.....
2	.....	5.2	5.3	12	4.7	5.1	.....	22	4.6	4.9	.....
3	.....	5.4	5.4	13	4.7	5.2	.....	23	4.55	4.8	.....
4	.....	5.2	5.3	14	4.65	5.1	.....	24	4.6	4.8	.....
5	4.6	5.0	5.2	15	4.7	5.0	.....	25	4.5	4.9	.....
6	4.8	5.1	.....	16	4.6	5.1	.....	26	4.6	5.0	.....
7	4.8	5.0	.....	17	4.7	5.1	.....	27	4.6	5.1	.....
8	4.8	4.9	.....	18	4.6	5.0	.....	28	4.6	5.3	.....
9	4.8	4.8	.....	19	4.6	4.9	.....	29	4.7	5.4	.....
10	4.7	4.9	.....	20	4.5	4.8	.....	30	5.0	5.8	.....
								31	.....	5.5	.....

CHENANGO RIVER AT BINGHAMTON, N. Y.

This station, which is located at the Court Street Bridge at Binghamton, was established July 31, 1901, to obtain general statistical and comparative data regarding the total flow of the Chenango, and has since been maintained in cooperation with the New York State engineer's department.

Tioughnioga River enters Chenango River from the northwest about 14 miles above the gaging station. The Chenango River enters Susquehanna River about three-fourths of a mile below the gaging

station, but a slight rift a short distance downstream from the bridge cuts off backwater from the Susquehanna at ordinary stages.

In estimating the run-off of Chenango River the area directly tributary to storage reservoirs, from which diversion is made to supply the Erie Canal, has been deducted from the total natural drainage area. The diversion area of six reservoirs at the head of Chenango River, whose outflow is turned into Erie Canal through Limestone Creek, is 30 square miles. The diversion area of De Ruyter reservoir, at the head of Tioughnioga River, whose outflow is turned into Erie Canal through Limestone Creek, is 18 square miles. These two areas have been subtracted from the natural drainiage area of 1,580 square miles, giving an effective area of 1,532 square miles. This estimate is approximate, as no allowance for direct inflow to feeder channels from additional areas, nor for waste into the original stream, has been made. The gross area from which more or less run-off is diverted is about 105 square miles.

About 1 mile upstream is the dam of the Binghamton Cold Storage Company. This is a low structure with 5-foot head, and constructed of large blocks of bluestone, laid dry, and allowing a large amount of leakage. Owing to this leakage, and to the fact that the water wheels run continuously night and day, the regimen of the stream below is not materially affected, and fluctuations in gage height are due almost entirely to natural causes. The next dam upstream is at Willards, about 16 miles above Binghamton and 2 miles above Chenango Forks.

The datum of the chain gage has remained the same during the maintenance of the station. During the winter months the discharge is usually very little affected by the presence of ice. The rating curve for low and medium stages has been fairly well developed; the high-water estimates, however, may be considerably in error, due to lack of sufficient discharge measurements and backwater effects from Susquehanna River.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Chenango River at Binghamton, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 20	Wood and Hoyt	290	535	5.67	648
1908.					
September 2	C. R. Adams	220	387	5.05	165
September 26	do			4.90	118
October 21	Wood and French	209	405	4.95	174
November 2	C. C. Covert	288	496	5.33	392

Daily gage height, in feet, of Chenango River at Binghamton, N. Y., for 1907–8.

[Hugh L. Smith, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	12.65	6.15	5.4	8.15	9.7	6.05	6.1	5.6	5.0	6.45	6.8	6.55
2	12.55	6.15	5.4	7.5	9.7	6.05	6.2	5.55	4.95	6.1	6.6	6.45
3	9.7	6.3	5.3	7.35	8.45	6.15	6.5	5.6	5.0	6.0	8.55	6.35
4	11.85	6.85	5.35	7.1	8.35	6.1	6.0	5.7	5.15	6.3	8.95	6.35
5	13.8	6.05	5.45	7.0	8.0	6.05	5.85	5.55	6.0	8.75	8.15	6.0
6	11.0	6.0	5.3	6.95	7.55	6.1	5.65	5.5	6.1	8.05	7.65	6.2
7	9.7	6.2	5.55	6.8	7.45	6.5	5.6	5.4	6.05	7.9	12.65	6.05
8	10.2	5.95	5.30	6.6	8.2	6.75	5.5	5.3	5.85	9.25	13.35	6.05
9	10.8	5.85	5.30	6.85	7.85	6.7	5.45	5.25	5.45	10.65	11.70	6.2
10	9.5	5.7	5.35	7.05	7.7	6.6	5.4	5.25	5.8	9.3	10.30	13.5
11	8.4	5.6	5.4	7.2	7.45	6.3	5.38	5.3	9.1	8.1	8.95	16.0
12	7.9	6.1	5.4	7.15	7.2	6.05	6.4	5.3	9.95	8.5	8.30	13.5
13	7.45	5.9	5.35	7.2	6.9	6.0	6.5	5.25	8.45	8.35	7.80	10.2
14	7.45	5.7	5.5	7.2	6.8	5.9	6.3	5.2	6.7	7.65	7.50	8.95
15	8.0	5.9	7.05	7.05	6.65	5.85	5.9	5.1	6.4	7.35	7.15	8.5
16	7.55	5.65	10.15	6.9	6.7	5.8	5.75	5.15	6.1	6.95	6.9	8.25
17	6.5	6.15	10.35	6.95	6.7	5.8	5.5	5.15	6.0	6.75	6.8	7.95
18	6.5	5.7	10.55	6.95	6.65	5.7	5.55	5.2	5.8	6.6	6.6	7.65
19	6.9	5.6	10.7	6.85	6.65	5.65	5.6	5.2	5.7	6.45	6.65	7.4
20	9.9	6.2	9.15	6.75	6.7	5.65	5.6	5.1	5.7	6.35	6.6	7.0
21	10.2	5.6	7.9	6.6	6.5	5.6	5.65	5.15	5.7	6.6	6.5	7.2
22	7.8	5.75	8.4	6.45	6.3	5.65	5.65	5.1	6.15	6.6	6.55	6.9
23	6.4	5.5	11.9	6.45	6.2	5.65	5.55	5.1	5.95	6.4	6.45	8.3
24	6.2	5.5	12.7	7.25	6.15	5.6	5.6	5.05	6.0	6.25	6.35	14.1
25	6.3	5.4	11.75	9.9	6.05	5.5	5.8	5.05	6.05	6.1	6.35	13.65
26	6.5	5.45	10.45	9.25	6.3	5.35	6.5	5.0	6.05	6.05	6.4	10.75
27	6.3	5.5	9.55	11.9	6.85	5.4	6.35	5.05	5.9	6.0	6.4	9.30
28	6.4	5.4	9.8	10.05	7.05	5.65	6.05	5.05	5.85	7.2	6.4	9.55
29	6.5	.....	10.8	9.7	6.6	5.5	5.6	5.0	5.8	9.0	6.65	11.05
30	6.35	.....	10.1	8.65	6.3	5.6	5.6	4.95	6.35	8.2	6.65	9.8
31	6.25	.....	.....	.....	6.2	.....	5.55	5.0	.....	7.2	.....	10.25
1908.[b]												
1	8.95	5.8	6.4	10.2	9.55	6.85	5.25	5.2	4.95	4.95	5.3	5.25
2	8.15	6.0	6.75	9.9	9.65	6.5	5.2	5.05	5.0	5.0	5.35	5.3
3	7.6	6.45	8.0	9.1	9.45	6.2	5.25	5.25	4.95	4.95	5.3	4.9
4	7.15	5.9	8.4	8.5	8.95	6.05	5.35	5.25	4.95	4.9	5.35	5.2
5	7.05	6.3	7.7	8.2	8.05	5.95	5.2	5.15	4.95	4.95	5.25	5.2
6	6.4	6.0	7.2	8.55	7.5	5.9	5.2	5.25	5.05	4.95	5.2	4.85
7	6.35	6.0	7.1	8.85	8.3	5.85	5.2	5.25	5.05	4.95	5.2	5.2
8	6.5	6.0	6.9	8.4	11.5	5.65	5.2	5.35	5.05	4.95	4.9	5.2
9	6.7	6.1	6.75	10.95	11.2	5.75	5.35	4.95	5.05	4.95	5.3	5.3
10	6.6	6.0	6.65	10.1	10.8	5.85	5.3	5.3	5.05	4.95	5.4	5.25
11	6.4	6.0	6.55	9.3	9.65	5.95	5.25	5.25	5.0	4.9	5.4	5.15
12	6.6	5.8	7.0	8.75	8.85	5.75	5.2	5.2	4.9	4.95	5.35	5.2
13	7.75	5.8	8.5	8.1	7.95	5.65	5.15	5.2	4.9	5.1	5.6	5.1
14	7.95	5.9	13.35	7.9	7.65	5.6	5.3	5.15	5.05	5.05	5.6	5.2
15	7.2	12.0	15.0	7.6	8.55	5.55	5.2	5.25	5.05	5.05	5.4	5.3
16	7.0	17.0	15.65	9.4	8.15	5.55	5.25	5.0	4.95	5.0	5.5	5.3
17	6.5	15.65	13.05	8.4	7.7	5.65	5.2	5.35	4.95	5.0	5.2	5.3
18	6.55	11.4	10.3	7.85	7.2	5.55	5.25	5.05	4.9	4.95	5.3	5.3
19	6.5	9.25	9.9	8.4	6.95	5.45	5.3	5.25	4.95	5.05	5.35	5.3
20	6.25	8.4	8.85	9.3	6.65	5.35	5.25	5.1	4.9	4.95	5.3	5.35
21	6.2	7.8	8.1	8.85	6.55	5.25	5.25	5.25	5.0	4.95	5.35	5.25
22	6.4	7.65	8.0	8.3	6.5	5.25	5.35	5.15	4.95	5.1	5.4	5.2
23	6.75	7.1	8.25	7.9	6.5	5.3	5.75	5.0	4.95	4.9	5.4	5.5
24	6.6	6.8	10.55	7.5	6.75	5.25	5.55	5.3	4.9	4.9	5.3	5.2
25	6.25	6.75	12.25	7.25	6.35	5.4	5.75	5.15	4.95	4.85	5.35	5.15
26	5.8	6.85	11.0	7.1	6.15	5.35	5.8	5.2	4.9	5.1	5.3	5.4
27	6.45	7.0	12.6	6.95	6.45	5.35	5.5	5.1	4.75	5.2	5.35	5.15
28	6.05	7.05	13.95	7.3	6.45	5.2	5.4	5.05	5.0	5.2	5.3	5.25
29	6.25	6.9	15.5	7.2	6.15	5.25	5.4	5.05	5.0	5.3	5.1	5.2
30	6.1	.....	14.4	6.95	6.15	5.35	5.35	4.9	4.9	5.4	5.35	5.2
31	5.8	.....	11.7	.....	6.35	.....	5.25	5.1	.....	5.35	.....	5.25

[a] Ice conditions at this station largely in the form of anchor ice obstruction. Portions of January to March and December, 1907, liable to error from this cause.

[b] Ice conditions from about Februray 1 to 14 and during the greater portion of December, 1908. Conditions of flow may also have been slightly affected by ice January 27 to 31, 1908.

Rating table for Chenango River at Binghamton, N. Y., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
4.70	35	6.10	1,210	7.50	3,220	9.80	7,140
4.80	70	6.20	1,345	7.60	3,375	10.00	7,500
4.90	115	6.30	1,480	7.70	3,535	10.20	7,860
5.00	170	6.40	1,615	7.80	3,695	10.40	8,220
5.10	235	6.50	1,755	7.90	3,855	10.60	8,590
5.20	305	6.60	1,895	8.00	4,020	10.80	8,970
5.30	380	6.70	2,035	8.20	4,355	11.00	9,350
5.40	460	6.80	2,180	8.40	4,695	12.00	11,250
5.50	550	6.90	2,325	8.60	5,040	13.00	13,250
5.60	645	7.00	2,470	8.80	5,390	14.00	15,300
5.70	745	7.10	2,615	9.00	5,740	15.00	17,400
5.80	850	7.20	2,765	9.20	6,090	16.00	19,500
5.90	960	7.30	2,915	9.40	6,440	17.00	21,700
6.00	1,080	7.40	3,065	9.60	6,790		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1901–1908 and is well defined below gage height 10 feet. Above gage height 9 feet the rating curve is based on one measurement at gage height 19.8 feet. The above table has been revised and differs slightly from that published in report of state engineer and surveyor, State of New York.

Monthly discharge of Chenango River at Binghamton, N. Y., for 1907–8.

[Drainage area, 1,530[a] square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.[b]						
January	14,900	1,340	5,110	3.34	3.85	B.
February	2,020	414	844	.552	.57	C.
March[c]	12,600	380	4,380	2.86	3.30	A.
April	11,100	1,680	3,470	2.27	2.53	A.
May	6,960	1,140	2,770	1.81	2.09	A.
June	2,110	420	1,010	.660	.74	A.
July	1,760	444	918	.600	.69	A.
August	745	142	340	.222	.26	A.
September	7,410	142	1,450	.948	1.06	A.
October	8,680	1,080	3,080	2.01	2.32	A.
November	14,000	1,550	3,830	2.50	2.79	A.
December	19,500	1,080	5,880	3.84	4.43	B.
The year	19,500	142	2,760	1.80	24.63	
1908.[d]						
January	5,650	850	2,130	1.39	1.60	A.
February	21,700	.....	3,690	2.41	2.60	B.
March	18,800	1,620	7,630	4.99	5.75	A.
April	9,260	2,400	4,810	3.14	3.50	A.
May	10,300	1,280	4,000	2.61	3.01	A.
June	2,250	305	737	.482	.54	A.
July	850	270	412	.269	.31	A.
August	420	115	282	.184	.21	A.
September	202	52	151	.099	.11	B.
October	460	92	192	.125	.14	B.
November	645	115	405	.265	.30	A.
December	.....	92	250	.163	.19	C.
The year	21,700	52	2,060	1.34	18.26	

[a] See description.

[b] Discharge February, 1907, has been corrected 10 per cent account of probable backwater effect from ice. Portions of January, March, and December, 1907, were also probably more or less affected; the mean for the month, however, is probably not affected more than a few per cent from this cause, and hence no correction has been attempted. (See rating table footnote.)

[c] Discharge interpolated March 31, 1907.

[d] Discharge during the frozen periods estimated on the basis of the discharge of adjacent drainages. It is only roughly approximate. Discharge February 1 to 14, 1908, 759 second-feet.

CHEMUNG RIVER BASIN.

DESCRIPTION.

Chemung River is formed near Painted Post, in the southeastern part of Steuben County, N. Y., by the confluence of Cohocton and Tioga rivers. Cohocton River, the north branch, drains the southern slope of the divide at the head of Keuka and Canandaigua lakes. Its drainage area lies wholly in the State of New York, and principally in Steuben County, and comprises approximately 630 square miles above the mouth. Tioga River rises in Tioga County, Pa., and flows northward, crossing the state line near Lawrenceville, Pa. The last 15 miles of its course lies in New York State. It has about 1,330 square miles of drainage area above its mouth. About 5 miles from its mouth the Tioga receives from the left Canisteo River, which rises in the northeast corner of Allegany County and flows in a southeasterly direction, draining, with its tributaries, the southern part of Steuben County. Its drainage area comprises about 540 square miles.

Chemung River proper is about 40 miles long. It flows eastward through the towns of Corning, Elmira, and Chemung and enters the Susquehanna at Athens, Bradford County, Pa. Near Chemung the river crosses the state line into Pennsylvania, and about 2 miles farther east it reenters New York, where it flows for a distance of about 4 miles, when it again crosses into Pennsylvania for the last 5 miles of its course. The drainage area above the mouth measures about 2,520 square miles.

In general the Chemung is sluggish throughout its course, flowing over a wide gravelly bed in a series of rifts and pools, and one or the other of the banks is usually low and subject to frequent overflows. The cities of Corning and Elmira have built extensive dikes to confine the waters at all stages. The stream has a yearly range of from about 100 second-feet to about 30,000 second-feet. One of the greatest floods recorded was on June 1, 1889. It was preceded by a phenomenal rainfall, aggregating several inches in a few hours, during the night of May 31. The discharge has been estimated at 67 second-feet per square mile from 2,055 square miles or 138,000 second-feet.[a]

CHEMUNG RIVER AT CHEMUNG, N. Y.

This station is located at the Suspension highway bridge midway between Willawana, Pa., and Chemung, N. Y., and is about one-half mile upstream from the state line and 1 mile below the Erie Railroad bridge. It was established September 7, 1903, to

[a] Report of Francis Collingwood, C. E., on the protection of the city of Elmira, N. Y., against floods.

obtain general statistical data regarding the flow of the Chemung, and is maintained in cooperation with the New York State engineer's department.

The Chemung was formerly paralleled by a canal taking its supply from dams across the stream. This has been abandoned, and the diversion dam is no longer in existence. At present the largest water-power development is at Elmira, N. Y. There are no dams between Elmira, N. Y., and the mouth of Chemung River.

The datum of the gage has remained the same during the maintenance of the station. Conditions for obtaining accurate discharge during the open period are only fair. At extreme high water the left bank is flooded, and at low stages there is more or less change in conditions of flow from year to year. On account of the numerous small riffs, considerable needle ice forms in this stream during the winter months. This collects under the ice in the smooth section at the gage and causes backwater conditions which make estimates for this period liable to considerable error. Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Chemung River at Chemung, N. Y., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 19	Wood and Hoyt	215	974	2.53	627
1908.					
September 6	C. R. Adams	183	845	1.81	139
September 29	do	185	867	1.68	101

Daily gage height, in feet, of Chemung River at Chemung, N. Y., for 1907–8.

[D. L. Orcutt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	6.72	3.97	.....	4.50	5.85	2.84	2.12	1.98	1.58	2.92	2.93	3.03
2	6.12	3.46	.....	4.14	5.29	2.84	4.25	1.94	1.66	2.56	2.87	2.92
3	5.20	3.08	.....	3.84	4.82	4.78	3.85	1.96	1.66	2.35	5.56	2.80
4	6.02	5.48	.....	3.78	4.32	4.00	3.26	1.88	1.72	2.32	5.11	2.70
5	7.43	4.83	.....	3.60	4.52	3.60	2.44	1.86	1.80	3.11	4.26	2.52
6	5.56	4.32	.....	3.54	4.18	4.11	2.74	1.95	2.12	3.22	3.91	2.58
7	5.31	4.20	.....	3.38	4.00	4.02	3.15	1.88	1.90	2.86	6.58	2.50
8	7.36	3.94	.....	3.34	4.90	3.58	3.14	1.91	1.84	2.60	6.96	2.60
9	8.71	3.83	.....	3.25	5.09	3.30	2.86	1.84	1.83	3.46	5.58	2.72
10	6.30	3.60	.....	3.42	5.00	3.10	2.82	1.88	1.82	3.63	4.98	4.08
11	5.45	3.49	.....	3.56	4.42	2.88	2.72	1.84	2.03	2.52	4.48	7.18
12	4.94	4.24	.....	3.98	4.42	2.90	3.48	1.78	2.11	2.92	4.16	5.82
13	4.69	.....	.....	4.26	4.15	2.76	4.60	1.78	2.20	3.10	3.82	4.64
14	4.79	.....	.....	4.23	3.92	2.76	3.55	1.76	2.14	2.90	3.60	4.34
15	6.66	.....	7.98	4.07	3.58	2.82	3.07	1.70	2.01	2.76	3.32	4.03
16	4.12	.....	6.28	3.81	3.48	2.81	2.78	1.66	1.88	2.62	3.13	4.11
17	4.28	.....	6.82	3.69	3.76	2.58	2.71	1.65	1.85	2.53	3.06	3.96
18	3.88	.....	6.74	3.79	3.56	2.54	2.82	1.65	1.82	2.36	2.99	3.74
19	4.64	.....	6.10	3.62	3.43	2.48	2.56	1.56	1.78	2.28	2.98	3.55
20	7.08	.....	5.43	3.54	3.64	2.39	2.51	1.62	1.86	2.31	3.04	3.25
21	7.62	.....	5.44	3.54	3.52	2.46	2.38	1.62	1.90	2.31	2.83	3.38
22	5.14	.....	5.28	3.33	3.29	2.58	2.36	1.63	1.82	2.40	3.10	3.05
23	4.24	.....	8.08	3.24	3.22	2.60	2.20	1.63	1.92	2.50	3.12	4.30
24	3.44	.....	7.40	6.70	3.04	2.48	2.20	1.66	1.80	2.47	2.98	12.12
25	3.52	.....	6.48	7.17	2.99	2.85	2.31	1.62	1.88	2.27	2.93	8.53
26	3.83	.....	5.56	6.86	2.46	2.94	2.18	1.60	1.86	2.25	2.86	6.57
27	3.54	.....	5.33	10.14	3.25	2.82	2.22	1.58	1.79	2.15	2.38	5.80
28	3.66	.....	6.35	7.32	3.57	2.65	2.05	1.61	1.75	2.46	2.92	7.00
29	3.61	.....	6.58	6.17	3.42	2.51	2.19	1.57	1.74	4.11	3.05	8.20
30	3.50	.....	5.86	5.40	3.10	2.68	1.48	1.58	1.93	3.70	3.15	6.50
31	4.59	.....	5.08	.....	2.98	.....	1.93	1.60	.....	3.24	.....	6.68
1908.[b]												
1	5.70	2.97	3.48	6.44	7.33	5.35	2.38	2.36	1.86	1.82	2.13	2.00
2	5.09	2.87	3.42	5.91	7.33	4.57	2.38	2.19	1.87	1.98	2.00	1.85
3	4.51	2.98	5.02	5.46	6.95	4.05	2.35	2.22	1.83	1.86	2.03	1.85
4	5.09	2.66	5.03	5.04	6.09	3.69	2.48	2.17	1.77	1.81	1.98	1.67
5	4.03	2.75	4.54	4.62	5.43	3.48	2.58	2.18	1.80	1.69	1.87	1.86
6	3.37	2.86	4.41	4.49	4.88	3.24	2.71	2.15	1.80	1.81	1.88	1.84
7	3.21	2.88	4.28	4.57	5.01	3.12	2.59	2.19	1.75	1.77	1.92	1.81
8	3.08	2.93	4.35	4.38	8.01	2.98	2.34	2.41	1.75	1.77	1.90	1.92
9	3.38	2.91	4.15	5.51	8.31	2.89	2.21	2.32	1.75	1.78	1.84	1.80
10	3.09	2.73	4.09	5.54	8.45	2.91	2.17	2.41	1.75	1.74	1.86	1.89
11	3.08	2.83	4.08	4.75	7.63	2.92	2.16	2.33	1.75	1.81	1.92	2.04
12	3.33	2.87	6.31	4.55	6.29	2.86	2.05	2.17	1.73	1.71	1.83	1.96
13	6.01	2.78	9.67	4.28	5.45	2.71	2.61	2.17	1.73	1.89	1.89	.....
14	6.33	3.10	13.38	4.13	4.95	2.71	2.65	2.19	1.69	1.86	1.89	.....
15	5.05	5.48	10.67	3.98	5.35	2.63	2.46	2.22	1.66	1.97	1.90	.....
16	4.62	14.75	12.69	4.29	6.35	2.61	2.35	2.07	1.65	1.81	1.86	.....
17	4.12	8.07	8.51	4.40	6.25	2.66	2.27	2.19	1.62	1.93	1.88	.....
18	3.69	6.12	6.82	4.07	5.48	2.53	2.24	2.17	1.68	1.76	1.91	.....
19	3.73	5.23	8.22	4.53	4.93	2.54	2.10	2.56	1.70	1.73	1.91	.....
20	3.51	4.55	7.59	6.53	4.58	2.45	2.17	2.41	1.68	1.89	1.94	.....
21	3.51	4.41	5.99	6.17	4.86	2.35	2.13	2.27	1.64	1.75	1.90	.....
22	3.51	4.13	5.87	5.41	5.18	2.43	2.33	2.21	1.70	1.70	1.87	.....
23	4.18	3.80	6.14	4.91	4.77	2.30	3.82	2.11	1.73	1.80	1.99	.....
24	3.71	3.59	6.85	4.51	4.41	2.43	3.00	2.07	1.69	1.76	2.02	.....
25	2.91	3.42	7.77	4.23	4.08	3.05	4.28	2.03	1.67	1.90	2.02	.....
26	2.70	3.63	6.76	4.05	3.73	2.91	4.64	2.04	1.67	1.77	2.01	.....
27	3.43	4.53	8.03	3.87	3.93	2.65	3.51	1.94	1.68	2.02	1.96	.....
28	3.23	4.23	9.25	4.08	4.48	2.51	3.07	1.95	1.64	2.64	1.92	.....
29	3.08	3.65	10.31	4.13	3.90	2.45	2.73	1.91	1.74	2.49	1.87	.....
30	3.57	.....	9.12	3.79	4.73	2.39	2.59	1.91	1.75	2.28	1.91	.....
31	3.04	.....	7.19	.....	5.90	.....	2.45	1.92	.....	2.26	.....	.....

[a] Conditions of flow affected by ice conditions from about January 23 to March 14, 1907.
[b] Ice conditions from about January 27 to February 14 and from about December 11 to 31, 1908.

Rating tables for Chemung River at Chemung, N. Y.

1905–1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	85	3.00	1,010	4.40	3,010	6.60	8,130
1.60	115	3.10	1,110	4.50	3,200	6.80	8,670
1.70	145	3.20	1,220	4.60	3,400	7.00	9,220
1.80	180	3.30	1,335	4.70	3,610	7.20	9,790
1.90	220	3.40	1,455	4.80	3,820	7.40	10,390
2.00	270	3.50	1,580	4.90	4,030	7.60	11,010
2.10	325	3.60	1,710	5.00	4,240	7.80	11,650
2.20	385	3.70	1,850	5.20	4,680	8.00	12,300
2.30	450	3.80	2,000	5.40	5,130	9.00	15,800
2.40	515	3.90	2,160	5.60	5,590	10.00	19,700
2.50	585	4.00	2,320	5.80	6,060	11.00	24,000
2.60	660	4.10	2,480	6.00	6,550	12.00	28,700
2.70	740	4.20	2,650	6.20	7,070	13.00	33,500
2.80	825	4.30	2,830	6.40	7,590	14.00	39,300
2.90	915						

NOTE.—This table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903–1907 and is well defined above gage height 1.9 feet.

1908.

1.60	75	2.10	280	2.60	630	3.10	1,105
1.70	105	2.20	340	2.70	715	3.20	1,215
1.80	140	2.30	405	2.80	805	3.30	1,330
1.90	180	2.40	475	2.90	900	3.40	1,455
2.00	225	2.50	550	3.00	1,000		

NOTE.—This table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903–1908 and is well defined. Above gage height 3.4 feet the table is the same as that for 1905–1907.

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Monthly discharge of Chemung River at Chemung, N. Y., for 1907–8.

[Drainage area, 2,440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.[a]						
January	14,700	.....	5,000	2.05	2.36	A.
February	.....	.....	972	.398	.41	D.
March	12,600	.....	4,250	1.74	2.01	A.
April	20,300	1,270	3,790	1.55	1.73	A.
May	6,180	557	2,350	.963	1.11	A.
June	3,780	508	1,100	.451	.50	A.
July	3,400	80	898	.368	.42	A.
August	260	103	162	.066	.08	C.
September	385	109	214	.088	.10	C.
October	2,500	355	845	.346	.40	A.
November	9,110	502	2,310	.947	1.06	A.
December	29,300	585	4,670	1.91	2.20	A.
The year	29,300	80	2,210	.906	12.38	
1908.[b]						
January	7,410	715	2,400	0.984	1.13	A.
February	42,900	.....	3,590	1.47	1.58	B.
March	35,300	1,480	10,300	4.22	4.86	A.
April	7,940	1,980	3,830	1.57	1.75	A.
May	13,800	1,900	6,020	2.47	2.85	A.
June	5,020	405	1,070	.439	.49	A.
July	3,480	252	765	.314	.36	A.
August	598	184	332	.136	.16	A.
September	168	81	115	.047	.05	A.
October	664	102	194	.080	.09	A.
November	298	152	193	.079	.09	A.
December	.....	.....	137	.056	.06	C.
The year	42,900	81	2,410	.989	13.47	

[a] During the period of ice conditions the discharge was estimated on the basis of the discharge of Chenango River at Binghamton and climatological reports.

	Second-feet.
Discharge January 23 to 31, 1907	1,550
February 1 to 12, 1907	1,600
February 13 to 28, 1907	500
March 1 to 14, 1907	400

[b] Discharge during frozen periods estimated on the basis of the discharge of adjacent drainages. It is only roughly approximate.

	Second-feet.
Discharge February 1 to 14, 1908	600
December 11 to 31, 1908	125

WEST BRANCH SUSQUEHANNA BASIN.

DESCRIPTION.

The West Branch of Susquehanna River rises in the mountains of Cambria County, at an elevation of not less than 2,000 feet above sea level, flows northeastward, and then southeastward into the Susquehanna above Sunbury. Its length is about 425 miles, and its drainage area, measured at mouth, comprises, approximately, 7,030 square miles (United States Geological Survey), all in Pennsylvania.

Topography of the basin rugged. The bed of the river, as a rule, is composed of gravel and sand, but rocky ledges occur at some points. The banks of main stream and tributaries are generally high, and there are few low grounds subject to overflow. The fall of the stream is variable, but much greater above Queens Run than

below, where the river traverses a wide, fertile, well-cultivated valley. Few forested areas remain. Facilities for artificial storage are probably good, and the flow of many of the tributaries might no doubt be regulated to considerable extent. The river was navigable, by means of the canal along its banks, to Lock Haven and beyond, prior to 1889, there being four canal dams on the stream, the ponds of which were used for navigation. The flood of 1889 so damaged the upper portion of the canal that it was not operated subsequent to that date above Muncy. From Muncy to Northumberland it was operated as late as 1897. No water was flowing in the canal at the Williamsport gaging station in 1895.

WEST BRANCH OF SUSQUEHANNA RIVER AT WILLIAMSPORT, PA.

This station is located at the Market Street Bridge in Williamsport. Lycoming Creek enters Susquehanna River from the north about 2 miles above the station, and Loyalsock Creek, also from the north, enters about 2 miles below the station. It was established March 1, 1895, by George D. Snyder, who was at that time city engineer of Williamsport. A standard chain gage was installed by the United States Geological Survey August 16, 1901. The gage is now maintained by the United States Weather Bureau, from whom the daily readings are obtained.

The data collected at this station are of value, in conjunction with other records of discharge in this drainage area, for comparative purposes and for navigation and power problems.

The datum of the gage has been unchanged since the establishment of the station. The discharge is usually affected by ice during the winter period. Conditions of flow at this point are constant and a good rating curve has been developed. There is a dam about one-half mile above the station, but it is believed that it has no effect on the relation of discharge to gage height.

Discharge data for this station prior to 1905 have been revised and republished in Water-Supply Paper No. 109.

Discharge measurements of West Branch of Susquehanna River at Williamsport, Pa., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. feet.*	*Feet.*	*Sec.-ft.*
July 23	A. H. Horton	722	3,570	1.39	2,780
October 14	K. C. Grant	766	3,860	1.72	3,350
1908.					
February 16	Grant and Ryder	934	17,400	16.32	99,100
March 20	Gannett and Langenheim	934	17,400	16.84	94,100
September 7 [a]	K. C. Grant	228	373	.29	614

[a] Measured by wading 500 feet below the dam.

Daily gage height, in feet, of West Branch of Susquehanna River at Williamsport, Pa., for 1907–8.

[Henry H. Guise, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	8.2	3.0	1.6	5.7	5.0	2.0	4.5	0.8	0.3	1.3	2.4	2.0
2	8.8	2.6	1.6	5.2	4.8	2.4	5.9	.7	.4	1.5	2.1	2.0
3	7.2	3.5	1.7	4.6	4.3	4.7	5.6	.8	.3	1.3	4.4	1.9
4	6.3	3.5	2.0	4.2	4.0	6.0	4.9	.6	.3	1.3	5.0	1.8
5	6.7	2.6	1.9	4.0	4.1	5.3	4.0	.6	.6	1.5	5.3	1.6
6	6.6	2.7	2.0	3.6	4.0	5.1	3.4	.7	.7	2.1	4.8	1.4
7	6.1	3.0	2.4	3.3	4.1	5.2	3.2	.6	.6	2.6	4.8	1.4
8	5.8	2.4	2.3	3.2	4.2	4.8	2.9	.6	.6	2.2	5.0	1.5
9	6.6	2.4	2.1	3.0	4.4	4.3	2.7	.8	.5	2.4	4.9	1.6
10	7.0	2.5	2.0	3.1	5.5	4.0	2.5	.7	.8	2.4	4.5	2.7
11	6.7	2.7	2.1	3.3	6.0	3.5	2.1	.7	1.1	2.5	4.1	6.4
12	5.8	2.2	2.2	3.0	5.5	3.1	2.0	.7	2.2	2.1	3.7	6.2
13	5.4	2.8	1.9	3.0	4.9	3.1	2.2	.9	1.5	1.8	3.3	5.9
14	6.4	2.2	2.9	3.0	4.5	3.0	2.8	.7	1.5	1.8	2.9	5.2
15	6.6	2.2	16.8	2.8	4.0	3.1	1.7	.7	1.3	1.6	2.7	4.7
16	7.9	2.3	13.9	2.7	3.7	3.5	1.7	.5	1.1	1.4	2.5	4.3
17	7.1	2.2	10.8	2.8	3.6	3.1	1.4	.4	1.0	1.3	2.2	3.9
18	6.1	2.4	10.7	2.7	3.3	2.7	1.4	.4	.8	1.2	2.1	3.5
19	5.7	2.3	10.5	2.6	3.0	2.4	1.6	.3	.7	1.1	2.0	3.2
20	6.3	2.1	10.4	2.7	3.1	2.1	1.5	.4	.9	1.1	2.0	2.5
21	11.0	2.0	12.4	2.4	2.9	2.2	1.8	.4	.9	1.0	2.0	2.3
22	9.6	2.2	10.4	2.4	2.6	2.1	1.7	.3	1.1	1.0	2.0	2.3
23	7.6	2.4	10.1	2.4	2.6	1.9	1.4	.3	1.3	1.0	2.2	2.3
24	6.1	1.9	11.2	2.5	2.3	2.3	1.2	.5	1.2	1.0	2.0	7.0
25	5.7	1.7	9.7	3.8	2.2	3.7	1.2	.4	1.2	1.0	2.2	10.0
26	4.4	1.7	8.0	4.5	2.2	3.3	1.0	.3	1.3	.9	2.0	8.4
27	4.4	1.5	7.0	5.9	2.1	3.0	1.0	.4	1.1	.9	1.8	6.5
28	3.7	1.7	6.7	7.4	2.3	3.2	1.0	.3	1.0	1.1	1.9	6.0
29	3.5	.....	7.3	6.5	2.5	2.9	1.0	.3	1.1	2.3	1.9	6.2
30	3.2	.....	7.4	5.4	2.2	2.7	1.3	.4	1.1	3.2	2.0	7.2
31	3.4	.....	6.4	.....	2.1	.....	1.1	.3	.....	3.0	.....	7.2
1908.[b]												
1	6.7	2.3	2.8	8.3	4.0	7.3	0.9	0.7	0.5	0.4	0.6	0.5
2	6.0	2.1	2.4	7.2	5.1	6.4	.8	.6	.4	.4	.6	.4
3	5.3	3.0	3.2	6.4	5.7	5.3	1.1	.5	.4	.4	.6	.4
4	4.7	2.8	6.2	6.1	5.7	4.7	1.2	.5	.4	.3	.5	.4
5	4.2	2.6	5.7	5.4	5.6	4.1	1.3	.7	.3	.3	.5	.4
6	3.7	2.6	5.1	5.0	5.2	3.6	1.3	.8	.3	.4	.5	.4
7	3.2	2.7	5.1	4.7	5.2	3.2	1.1	1.0	.3	.4	.5	.4
8	3.0	2.9	7.6	4.4	9.0	2.8	1.0	1.4	.3	.3	.5	.4
9	2.9	2.9	7.5	4.6	10.5	2.5	.9	1.0	.3	.3	.5	.5
10	3.1	2.4	7.1	6.2	9.4	2.6	.7	1.0	.3	.3	.4	.5
11	2.8	2.3	6.4	6.6	8.2	2.5	.6	1.0	.3	.4	.4	.5
12	2.5	2.2	6.7	5.9	7.1	2.3	.6	.9	.3	.4	.4	.5
13	7.4	2.1	8.5	5.5	6.1	2.1	.7	.8	.2	.4	.4	.5
14	9.0	2.1	11.2	4.8	5.4	1.9	.7	.7	.2	.4	.4	.5
15	7.8	2.6	13.4	4.3	5.3	1.8	.7	.7	.2	.4	.4	.6
16	6.5	17.0	15.8	4.5	7.8	1.7	.7	.7	.2	.3	.4	.6
17	5.5	13.2	15.0	5.2	8.2	2.0	.7	.7	.2	.3	.4	.6
18	4.9	9.3	11.4	5.1	8.3	1.8	.8	.8	.2	.3	.4	.6
19	4.3	7.4	12.3	5.2	7.9	1.6	.4	.9	.2	.3	.5	.7
20	3.8	6.2	17.4	6.0	7.6	1.4	.6	.9	.2	.3	.5	.9
21	3.5	5.4	13.1	6.5	10.9	1.3	.6	.9	.2	.3	.5	2.7
22	3.4	4.6	9.9	6.0	9.9	1.2	1.0	.9	.2	.3	.5	1.9
23	3.4	4.1	8.5	5.3	9.8	1.1	2.1	.7	.2	.3	.5	1.5
24	3.4	3.6	8.2	4.8	10.2	1.0	2.0	.7	.2	.3	.5	1.1
25	2.3	3.2	9.0	4.3	8.4	1.0	2.5	.6	.2	.3	.5	.9
26	2.6	3.2	9.5	4.1	6.9	1.3	2.0	.6	.2	.5	.5	.8
27	2.5	4.7	9.4	3.9	6.5	1.1	1.5	.6	.2	1.4	.5	.8
28	2.9	4.3	11.2	3.8	6.4	1.0	1.2	.6	.2	1.2	.5	.8
29	2.8	3.2	12.2	3.6	5.6	.9	1.1	.5	.3	1.1	.5	.9
30	2.5	.....	12.4	3.2	5.5	.9	1.0	.5	.3	1.0	.5	1.0
31	2.7	.....	10.2	.....	7.8	.....	.8	.5	.....	.9	.....	1.0

[a] Discharge was not materially affected by ice conditions, 1907–8. River frozen over above the dam during February, 1907.

[b] Discharge not materially affected by ice conditions during 1907–8.

Rating table for West Branch of Susquehanna River at Williamsport, Pa., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.20	495	1.90	3,740	3.60	8,400	6.60	20,980
.30	630	2.00	3,980	3.70	8,710	6.80	21,900
.40	775	2.10	4,220	3.80	9,030	7.00	22,900
.50	930	2.20	4,470	3.90	9,360	8.00	28,000
.60	1,090	2.30	4,720	4.00	9,690	9.00	33,460
.70	1,260	2.40	4,970	4.20	10,400	10.00	39,180
.80	1,440	2.50	5,230	4.40	11,150	11.00	45,400
.90	1,630	2.60	5,490	4.60	11,940	12.00	52,400
1.00	1,820	2.70	5,750	4.80	12,750	13.00	60,300
1.10	2,010	2.80	6,020	5.00	13,600	14.00	69,100
1.20	2,210	2.90	6,300	5.20	14,470	15.00	78,400
1.30	2,410	3.00	6,580	5.40	15,350	16.00	88,400
1.40	2,620	3.10	6,870	5.60	16,250	17.00	98,600
1.50	2,830	3.20	7,170	5.80	17,150	18.00	109,000
1.60	3,050	3.30	7,470	6.00	18,060		
1.70	3,270	3.40	7,780	6.20	18,980		
1.80	3,500	3.50	8,090	6.40	19,940		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1902–1908, and is well defined.

Monthly discharge of West Branch of Susquehanna River at Williamsport, Pa., for 1907–8.

[Drainage area, 5,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	45,400	7,170	20,100	3.56	4.10	A.
February	8,090	2,830	4,980	.883	.92	A.
March	96,600	3,050	24,400	4.33	4.99	A.
April	24,900	4,970	9,350	1.66	1.85	A.
May	18,100	4,220	8,840	1.57	1.81	A.
June	18,100	3,740	8,010	1.42	1.58	A.
July	17,600	1,820	5,230	.927	1.07	A.
August	1,630	630	994	.176	.20	A.
September	4,470	630	1,770	.314	.35	A.
October	7,170	1,630	3,250	.576	.66	A.
November	14,900	3,500	7,090	1.26	1.41	A.
December	39,200	2,620	12,000	2.13	2.46	A.
The year	96,600	630	8,830	1.57	21.40	
1908.						
January	33,500	4,770	11,300	2.00	2.31	A.
February	98,600	4,220	14,100	2.50	2.70	A.
March	103,000	4,970	37,800	6.70	7.72	A.
April	29,600	7,170	14,900	2.64	2.94	A.
May	44,800	9,690	24,800	4.40	5.07	A.
June	24,400	1,630	5,710	1.01	1.13	A.
July	5,230	775	2,060	.365	.42	A.
August	2,620	930	1,370	.243	.28	A.
September	930	495	582	.103	.11	A.
October	2,620	630	916	.162	.19	A.
November	1,090	775	900	.160	.18	A.
December	5,750	775	1,440	.255	.29	A.
The year	103,000	495	9,660	1.71	23.34	

NOTE.—Open-channel rating applied throughout 1907–8.

JUNIATA RIVER BASIN.

DESCRIPTION.

Juniata River rises in the mountains of Bedford, Blair, and Somerset counties, Pa., at a general elevation of about 2,000 feet above the sea, though the divide between its waters and those of the Ohio attains in places an elevation of 2,800 feet. The river has two chief upper divisions, the Frankstown and the Raystown branches; from their union, a few miles southeast of Huntington, the main river winds eastward to the point where it enters the Susquehanna at Duncans Island. The length of the river below the branches is about 75 miles, and its total drainage area, measured at mouth, comprises 3,530 square miles (United States Geological Survey).

The Frankstown Branch rises in northwestern Bedford County, and flows first northeast, then southeast, to the point where it receives the Raystown Branch, its length being about 50 miles and its drainage area measuring 933 square miles; the Raystown Branch rises in eastern Somerset County, and flows east and northeast to its union with the Frankstown Branch, its length being about 70 miles and its drainage area 909 square miles.

The valley of the main river is very narrow and the banks are generally high, with few low grounds to be overflowed. The bed is, as a rule, of gravel and sand, often with rock at very small depth and in places at the surface. For elevations and slope see Water-Supply Paper No. 109.

The whole basin of the river is traversed from southwest to northeast by a number of parallel ranges, across and between which the river and its tributaries wind. There are no lakes in the region, but facilities for artificial storage are good. Two miles above Hollidaysburg is an artificial reservoir, formerly used as a feeder for a canal. This reservoir has an area of about 600 acres and a depth of 20 feet, and is formed by a dam 850 feet long and 30 feet high, built mainly of earth. A small amount of power could be used here. A canal extends up the river to Huntington, following the stream closely for the entire distance. The Pennsylvania Railroad also follows the main river, the Frankstown Branch, and the Little Juniata almost to the summit of the mountains. There is very little manufacturing in the basin, and there are no mills of importance on the main stream below the mouth of the Raystown Branch. Little power is used from the canal, but a large amount might be developed, especially at the locks, where considerable water wastes.

The river has a large number of tributaries, but these offer few or no precipitous falls and fewer rapids than the main river, except where they cut through the ranges from one valley to an adjacent one. Their flow is variable, their banks vary in height, and they sometimes overflow considerable areas of bottom land.

JUNIATA RIVER AT NEWPORT, PA.

This station is located at the steel highway bridge about 800 feet east of the public square at Newport. Buffalo Creek enters the river from the west about 1 mile above the station. There are no important tributaries between Newport and the mouth of the Juniata, a distance of about 12 miles. This station was established March 21, 1899, by the United States Geological Survey, and was discontinued from July 15, 1906, to January 6, 1907. It is now being maintained by the Pennsylvania state water supply commission, from whom the tables of daily gage heights and discharge measurements made by engineers of the commission are obtained.

The datum of the chain gage has remained constant during the maintenance of the station. The discharge is usually affected by ice conditions. Conditions of flow are liable to change from year to year. A good rating curve has been developed for high and medium stages, and at low stages it is fairly good.

Discharge data for this station prior to 1905 have been revised and republished in Water-Supply Paper No. 109.

Discharge measurements of Juniata River at Newport, Pa., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 24	A. H. Horton	469	986	3.32	1,620
October 11	K. C. Grant	505	1,050	3.41	1,590
1908.					
February 16 [a]	Farley Gannett	617	7,150	13.70	39,900
February 17	Gannett and Grant	616	5,500	10.80	27,400
Do [a]	do	615	5,050	10.20	24,700
March 9	K. C. Grant	619	6,540	12.58	35,300
March 19	Farley Gannett	637	10,700	19.15	73,700
September 10	F. E. Langenheim	470	848	2.74	652

[a] Float measurement.

Daily gage height, in feet, of Juniata River at Newport, Pa., for 1907–8.

[A. R. Bortel, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	4.15	7.65	4.75	4.5	3.8	4.4	3.0	3.0	3.5	3.2	4.2
2	.....	4.1	7.85	4.5	4.5	4.55	4.25	3.1	3.0	3.5	3.1	4.05
3	.....	4.35	8.0	4.5	4.4	6.95	4.15	3.1	2.9	3.3	4.75	4.0
4	.....	4.4	8.15	4.4	4.3	7.0	3.90	2.95	3.2	3.4	5.5	3.9
5	.....	4.2	8.2	4.4	4.3	6.0	3.75	3.0	4.5	3.5	4.75	3.85
6	.....	4.05	7.9	4.3	4.4	5.7	3.7	3.1	4.0	3.55	4.45	3.7
7	5.1	3.9	7.6	4.25	4.45	5.65	3.5	3.0	4.0	3.6	4.3	3.7
8	5.0	3.9	7.15	4.2	4.6	5.1	3.65	3.1	3.7	3.5	4.65	3.55
9	5.05	3.7	6.1	4.7	5.55	4.75	3.6	3.1	3.4	3.4	4.8	3.65
10	4.95	3.9	5.15	6.45	7.6	4.55	3.5	3.05	3.6	3.4	4.7	6.15
11	4.8	4.0	5.6	6.25	7.4	4.4	3.5	3.2	5.0	3.4	4.6	9.3
12	4.85	4.05	5.1	5.7	6.5	4.4	3.6	3.35	5.65	3.4	4.2	8.55
13	6.85	3.9	5.3	5.5	5.65	4.85	3.5	3.15	4.95	3.3	4.1	6.7
14	9.75	3.85	18.0	5.15	5.15	5.45	3.6	3.15	4.35	3.2	3.9	5.6
15	11.4	4.0	22.1	4.95	4.95	6.75	3.5	3.1	3.85	3.2	3.8	5.35
16	11.05	4.1	15.65	4.8	4.7	6.75	3.4	2.95	3.7	3.2	3.7	5.05
17	8.55	3.85	12.0	4.6	4.55	5.65	3.4	3.0	3.5	3.1	3.7	4.6
18	7.3	4.0	11.1	4.5	4.4	5.0	3.4	3.0	3.4	3.1	3.5	4.5
19	6.9	4.0	10.9	4.45	4.25	4.6	3.75	2.8	3.5	3.1	3.5	4.35
20	7.95	4.0	14.6	4.4	4.1	4.35	3.95	2.95	3.55	3.1	3.6	4.15
21	9.25	3.95	15.15	4.4	4.05	4.3	3.6	2.9	3.45	3.1	3.8	4.0
22	8.65	4.0	10.7	4.4	3.95	4.2	3.4	2.75	3.6	3.0	3.9	4.0
23	7.0	7.8	8.85	4.3	3.85	4.0	3.5	2.9	3.85	3.1	3.9	4.3
24	6.0	7.4	8.35	4.55	3.8	4.3	3.3	3.1	4.05	3.1	3.9	6.15
25	5.6	7.7	6.9	5.25	3.8	4.3	3.1	3.20	3.9	3.1	4.15	8.2
26	5.35	7.25	6.3	5.6	3.8	4.15	3.2	3.6	3.85	3.0	4.5	8.05
27	5.05	7.4	5.65	5.3	3.9	3.95	3.2	3.5	3.6	3.0	4.6	7.8
28	4.5	7.45	5.7	5.05	3.9	3.85	3.1	3.35	3.5	3.25	4.45	7.1
29	4.15	.....	5.55	4.8	3.9	3.7	3.2	3.25	3.5	3.4	4.3	6.5
30	4.15	.....	5.2	4.6	3.9	3.8	3.2	3.2	3.4	3.65	4.25	6.6
31	4.25	.....	4.95	.....	3.75	.....	.....	3.0	.....	3.45	.....	7.15
1908.[b]												
1	6.7	3.7	4.5	5.75	4.35	6.25	3.25	3.3	2.9	3.5	3.0	3.0
2	6.0	3.5	4.45	5.7	4.55	5.55	3.35	3.15	3.0	3.2	3.05	2.85
3	5.5	4.75	4.55	5.75	4.4	5.05	3.5	3.1	2.9	3.05	3.0	3.1
4	5.15	4.85	5.3	5.8	4.35	4.7	3.5	3.05	2.8	3.0	3.0	3.0
5	4.85	4.8	5.7	5.55	4.25	4.5	3.6	3.0	2.8	3.0	3.0	3.0
6	4.7	4.6	5.7	5.35	4.35	4.4	3.85	3.1	2.9	3.0	2.9	2.9
7	4.3	4.5	9.3	5.2	5.9	4.2	3.4	3.1	2.8	2.95	2.9	2.85
8	4.1	4.4	12.5	5.0	12.85	4.05	3.3	3.1	2.85	2.9	2.9	2.9
9	4.0	4.9	12.75	5.25	11.15	4.0	3.25	3.1	2.7	3.0	2.85	3.05
10	4.1	5.2	11.8	6.1	9.1	4.05	3.1	3.1	2.75	3.0	3.0	3.25
11	3.95	5.0	9.9	5.85	7.75	4.05	3.1	3.1	2.75	3.0	2.8	3.1
12	5.05	5.05	10.7	5.7	6.6	4.0	3.1	3.1	2.9	2.95	3.0	3.5
13	11.15	4.95	11.7	5.55	5.9	3.85	3.1	3.1	2.9	3.0	3.0	3.4
14	11.45	5.2	12.5	5.25	5.4	3.8	3.2	3.0	2.9	3.0	2.9	3.0
15	8.55	6.9	12.25	5.05	5.25	3.8	3.25	3.0	2.8	3.05	3.0	3.0
16	7.0	13.9	12.3	5.1	5.45	3.75	3.5	3.0	2.8	2.9	2.9	3.1
17	6.05	10.9	11.2	5.0	6.15	3.85	3.3	2.95	2.8	2.9	2.8	3.0
18	6.55	7.55	9.65	4.75	6.65	3.8	3.2	3.05	2.8	2.9	2.8	3.2
19	5.1	6.2	17.45	4.85	6.0	3.7	3.1	3.1	2.75	2.85	3.0	3.75
20	4.85	5.55	19.6	5.5	15.6	3.6	3.1	3.05	2.8	2.95	2.9	4.25
21	4.7	5.25	13.15	5.6	13.75	3.6	3.1	3.0	2.7	2.85	3.05	4.15
22	4.65	4.8	9.7	5.25	10.9	3.5	3.25	3.1	2.8	2.85	3.0	3.75
23	5.0	4.6	8.25	4.9	12.0	3.5	3.3	3.1	2.8	2.9	3.0	3.4
24	5.35	4.5	7.45	4.7	9.25	3.5	3.2	3.1	2.8	2.85	2.95	3.3
25	5.05	4.45	7.05	4.6	7.6	3.55	3.75	3.05	2.9	3.0	2.8	3.05
26	4.7	5.1	6.75	4.5	6.7	3.6	3.55	3.1	2.8	3.2	2.9	3.15
27	4.7	9.3	6.2	4.5	8.15	3.45	5.5	3.05	2.85	3.2	3.0	3.1
28	5.0	5.6	6.1	4.75	7.0	3.4	4.25	2.9	2.8	3.2	3.0	3.25
29	4.7	4.65	6.1	4.4	5.85	3.25	3.75	2.9	3.45	3.15	2.85	3.2
30	4.4	.....	6.25	4.2	5.75	3.25	3.5	3.0	3.7	3.1	2.9	3.1
31	4.1	.....	5.95	.....	6.4	.....	3.4	3.0	.....	3.1	.....	3.1

[a] Discharge affected by ice conditions from about February 23 to March 13, 1907.
[b] Discharge probably not affected by ice conditions during 1908.

Rating table for Juniata River at Newport, Pa., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.70	610	4.30	3,770	5.90	8,570	9.00	19,940
2.80	725	4.40	4,050	6.00	8,890	10.00	24,140
2.90	845	4.50	4,330	6.20	9,540	11.00	28,540
3.00	975	4.60	4,610	6.40	10,200	12.00	33,100
3.10	1,115	4.70	4,900	6.60	10,880	13.00	38,020
3.20	1,270	4.80	5,190	6.80	11,560	14.00	43,280
3.30	1,440	4.90	5,480	7.00	12,260	15.00	48,780
3.40	1,620	5.00	5,780	7.20	12,970	16.00	54,520
3.50	1,810	5.10	6,080	7.40	13,700	17.00	60,440
3.60	2,020	5.20	6,380	7.60	14,440	18.00	66,440
3.70	2,240	5.30	6,690	7.80	15,200	19.00	72,600
3.80	2,470	5.40	7,000	8.00	15,960	20.00	78,800
3.90	2,710	5.50	7,310	8.20	16,740	21.00	85,180
4.00	2,970	5.60	7,620	8.40	17,520	22.00	91,580
4.10	3,230	5.70	7,930	8.60	18,320	22.10	92,220
4.20	3,500	5.80	8,250	8.80	19,120		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1899–1908, and is well defined above gage height 4 feet. Below this gage height it is fairly well defined.

Monthly discharge of Juniata River at Newport, Pa., for 1907–8.

[Drainage area, 3,480 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	30,300	3,360	14,000	4.02	4.64	A.
February	.....	2,240	2,910	.836	.87	B.
March	92,200	.....	17,800	5.12	5.90	B.
April	10,400	3,500	5,340	1.53	1.71	A.
May	14,400	2,360	4,780	1.37	1.58	A.
June	12,300	2,240	5,610	1.61	1.80	A.
July	4,050	1,120	1,970	.566	.65	A.
August	2,020	668	1,130	.325	.37	B.
September	7,780	845	2,580	.741	.83	A.
October	2,130	975	1,440	.414	.48	A.
November	7,310	1,120	3,460	.994	1.11	A.
December	21,200	1,920	7,540	2.17	2.50	A.
The year	92,200	668	5,710	1.64	22.44	
1908.						
January	30,600	2,840	7,840	2.25	2.59	A.
February	42,700	1,810	8,510	2.45	2.64	A.
March	76,300	4,190	22,700	6.52	7.52	A.
April	9,210	3,500	6,360	1.83	2.04	A.
May	52,200	3,640	14,900	4.28	4.93	A.
June	9,700	1,360	3,060	.879	.98	A.
July	7,310	1,120	1,790	.514	.59	A.
August	1,440	845	1,060	.305	.35	B.
September	2,240	610	836	.240	.27	B.
October	1,810	785	1,010	.290	.33	B.
November	1,040	725	896	.257	.29	B.
December	3,640	785	1,370	.394	.45	A.
The year	76,300	610	5,860	1.68	22.98	

NOTE.—Discharge January 1 to 6 and February 23 to March 13, 1907, estimated on the basis of the discharge of West Branch Susquehanna River at Williamsport.

	Second-feet.
Discharge January 1 to 6, 1907	25,000
February 23 to 28, 1907	2,500
March 1 to 13, 1907	2,500

Discharge interpolated July 31, 1907.

BROAD CREEK AT MILL GREEN, MD.

Broad Creek rises in the northern part of Harford County, flows southeastward, and then northeastward into the Susquehanna. Its fall is gradual, the bed is of gravel or sand, the banks are generally low, and the flow is variable.

This station is located at the steel highway bridge in the village of Mill Green. No important tributaries enter Broad Creek in the immediate vicinity of Mill Green. The station is about 8 miles above the junction of Broad Creek with the Susquehanna. It was established December 14, 1904, and was discontinued March 31, 1909. The observer was paid by the Maryland state weather service.

This station was established to determine the regimen of flow of Broad Creek for power purposes.

The datum of the chain gage has remained constant since the establishment of the station. The discharge is often affected by ice during the winter period. Conditions of flow have remained practically constant during the maintenance of the station, and a good low-water rating curve has been developed.

The following discharge measurement was made May 21, 1908: Width, 30 feet; area, 39 square feet; gage height, 2.47 feet; discharge, 26.0 second-feet.

Daily gage height, in feet, of Broad Creek at Mill Green, Md., for 1907–8.

[E. T. Treakle, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	2.78	2.42	2.38	2.41	2.34	2.38	2.31	2.70	2.20	2.45	2.25	2.5
2	2.58	2.48	4.60	2.40	2.34	2.70	2.26	2.42	2.21	2.4	2.54	2.51
3	2.51	2.44	2.82	2.41	2.31	2.58	2.30	2.32	2.20	2.39	2.55	2.5
4	2.77	2.48	2.50	2.40	2.42	2.56	2.29	2.30	2.20	2.42	2.38	2.51
5	2.62	2.70	3.48	2.41	2.35	2.62	2.25	2.26	2.20	2.4	2.29	2.5
6	2.60	2.80	2.52	2.36	2.35	2.42	2.25	2.26	2.19	2.39	2.42	2.49
7	2.57	2.65	2.45	2.38	2.38	2.37	2.30	2.24	2.16	2.38	3.28	2.49
8	2.48	2.62	3.25	2.44	2.38	2.39	3.00	2.22	2.22	2.4	2.55	2.5
9	2.55	2.52	2.92	2.75	2.52	2.39	2.32	2.65	2.20	2.38	2.5	2.49
10	2.50	2.48	2.42	2.58	2.39	2.35	2.34	2.32	2.19	2.34	2.7	4.10
11	2.46	2.48	2.48	2.45	2.38	2.43	2.40	2.29	2.35	2.34	2.55	2.75
12	2.73	2.46	2.50	2.41	2.34	2.36	2.40	2.30	2.24	2.3	2.45	2.62
13	2.51	2.48	4.60	2.46	2.32	2.35	2.32	2.29	2.19	2.31	2.42	2.62
14	2.66	2.52	3.75	2.41	2.31	2.39	2.29	2.25	2.18	2.3	2.39	4.3
15	2.74	2.44	2.90	2.38	2.32	2.38	2.30	2.24	2.16	2.3	2.39	3.3
16	2.61	2.42	2.72	2.36	2.38	2.35	2.29	2.21	2.15	2.3	2.39	2.75
17	2.62	2.42	2.68	2.38	2.34	2.31	2.62	2.21	2.82	2.29	2.39	2.7
18	2.55	2.35	2.78	2.36	2.31	2.30	2.85	2.24	2.25	2.29	2.45	2.71
19	2.59	2.44	3.12	2.36	2.34	2.31	2.52	2.20	2.22	2.3	2.58	2.65
20	3.28	2.44	2.75	2.35	2.48	2.30	2.34	2.22	2.19	2.3	2.5	2.6
21	2.60	2.41	2.60	2.35	2.38	2.35	2.30	3.36	2.24	2.29	2.65	2.65
22	2.52	2.42	2.57	2.34	2.34	2.34	2.29	2.29	2.22	2.25	2.5	2.62
23	2.48	2.58	2.55	2.45	2.30	2.34	2.26	2.28	4.10	2.24	2.48	4.85
24	2.65	2.62	2.52	2.54	2.31	2.29	2.26	3.22	2.52	2.21	4.28	3.35
25	2.52	2.59	2.49	2.39	2.30	2.29	2.26	2.32	2.45	2.25	3.05	2.68
26	2.50	2.39	2.48	2.40	2.36	2.30	2.26	2.29	2.32	2.28	2.78	2.6
27	2.52	2.30	2.46	2.39	2.60	2.29	2.25	2.28	2.35	2.32	2.6	2.62
28	2.45	2.33	2.48	2.39	2.42	2.26	2.21	2.26	2.34	2.50	2.52	2.6
29	2.54	.....	2.45	2.36	2.32	2.60	2.25	2.22	2.88	2.44	2.5	2.62
30	2.44	.....	2.44	2.34	2.31	2.39	2.24	2.20	2.50	2.38	2.5	2.88
31	2.44	.....	2.40	.....	2.34	.....	2.22	2.22	.....	2.34	.....	2.68

[a] Ice conditions prevailed from about January 24 to February 28, 1907.

Daily gage height, in feet, of Broad Creek at Mill Green, Md., for 1907–8—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.[a]												
1	2.62	2.90	2.60	2.55	2.40	2.35	2.25	2.28	2.20	2.25	2.30	2.22
2	2.60	2.68	2.62	2.62	2.38	2.35	2.22	2.25	2.20	2.19	2.29	2.20
3	2.58	2.60	2.58	2.52	2.39	2.39	2.24	2.25	2.18	2.18	2.29	2.20
4	2.60	2.58	2.50	2.50	2.42	2.38	2.21	2.25	2.16	2.15	2.29	2.22
5	2.60	2.68	2.58	2.49	2.50	2.34	2.20	2.25	2.18	2.15	2.29	2.22
6	2.60	2.70	2.62	2.49	2.52	2.32	3.70	2.32	2.40	2.16	2.25	2.25
7	2.62	2.65	4.68	2.46	3.65	2.31	2.26	2.85	2.25	2.16	2.24	2.70
8	4.00	2.65	2.62	2.55	2.68	2.30	2.25	2.26	2.20	2.18	2.25	2.28
9	2.78	2.68	3.25	2.52	2.62	2.31	2.24	2.30	2.20	2.18	2.25	2.24
10	2.65	2.62	2.70	2.50	2.52	2.31	2.20	2.26	2.18	2.16	2.21	2.20
11	2.86	2.58	2.69	2.51	2.50	2.32	2.20	2.24	2.16	2.19	2.21	2.24
12	3.66	2.65	2.68	2.49	2.50	2.32	2.20	2.20	2.16	2.19	2.20	2.42
13	2.95	3.70	2.65	2.45	2.46	2.29	2.20	2.20	2.16	2.15	2.20	2.32
14	2.80	3.60	2.60	2.45	2.46	2.29	2.74	2.19	2.15	2.15	2.20	2.21
15	2.75	3.90	2.61	2.50	2.46	2.54	2.25	2.30	2.15	2.15	2.24	2.22
16	2.68	2.70	2.60	2.50	2.51	2.40	2.20	2.20	2.15	2.14	2.21	2.26
17	2.62	2.65	2.55	2.49	2.45	2.38	2.20	2.24	2.16	2.13	2.25	2.30
18	2.61	2.72	2.52	2.50	2.42	2.32	2.19	2.25	2.16	2.15	2.32	2.36
19	2.60	3.05	2.55	2.51	2.50	2.34	2.18	2.20	2.16	2.15	2.38	2.32
20	2.60	2.80	2.58	2.49	2.50	2.31	2.18	2.19	2.16	2.15	2.30	2.26
21	2.64	2.75	2.55	2.45	2.52	2.30	2.22	2.16	2.18	2.15	2.30	2.28
22	2.62	2.75	2.51	2.45	2.49	2.30	2.68	2.16	2.18	2.18	2.29	2.30
23	2.60	2.62	2.50	2.44	2.45	2.30	2.30	2.15	2.15	2.19	2.30	2.35
24	2.70	2.52	2.54	2.40	2.40	2.28	2.60	2.16	2.18	2.19	2.35	2.32
25	2.88	2.52	2.55	2.40	2.40	2.28	5.30	2.19	2.16	2.45	2.25	2.25
26	2.72	5.90	2.50	2.40	2.40	2.28	2.40	3.38	2.16	2.65	2.25	2.25
27	2.82	2.75	2.50	2.40	2.38	2.28	2.30	2.34	2.20	2.34	2.25	2.25
28	2.65	2.68	2.50	2.38	2.35	2.25	2.30	2.29	2.22	2.32	2.25	2.25
29	2.70	2.62	2.62	2.39	2.36	2.25	2.29	2.25	2.28	2.38	2.25	2.28
30	2.68	.....	2.61	2.40	2.35	2.25	2.25	2.20	2.19	2.45	2.25	2.25
31	2.74	.....	2.72	.....	2.35	.....	2.26	2.20	.....	2.34	.....	2.34

[a] It is probable that the flow of the creek was not materially obstructed by ice conditions during 1908.

Rating table for Broad Creek at Mill Green, Md., for 1904–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.00	6	2.90	55	3.80	155	4.70	294
2.10	8	3.00	64	3.90	169	4.80	311
2.20	11	3.10	74	4.00	184	4.90	328
2.30	15	3.20	84	4.10	199	5.00	345
2.40	20	3.30	94	4.20	214	5.20	380
2.50	26	3.40	105	4.30	230	5.40	416
2.60	32	3.50	117	4.40	246	5.60	452
2.70	39	3.60	129	4.50	262	5.80	490
2.80	47	3.70	142	4.60	278	6.00	528

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 7 discharge measurements made during 1905–1908 and is well defined between gage heights 2.2 feet and 3.3 feet.

Monthly discharge of Broad Creek at Mill Green, Md., for 1907–8.

[Drainage area, 16.4 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	92	.....	30.4	1.85	2.13	B.
February	.....	.....	20.0	1.22	1.27	D.
March	278	19	56.8	3.46	3.99	A.
April	43	17	21.2	1.29	1.44	A.
May	32	15	18.5	1.13	1.30	A.
June	39	13	20.1	1.23	1.37	A.
July	64	11	18.4	1.12	1.29	A.
August	101	11	20.4	1.24	1.43	B.
September	199	10	22.4	1.37	1.53	B.
October	26	11	17.1	1.04	1.20	A.
November	227	13	36.1	2.20	2.46	A.
December	320	25	58.2	3.55	4.09	B.
The year	320	10	28.3	1.72	23.50	
1908.						
January	184	31	46.3	2.82	3.25	A.
February	509	27	65.9	4.02	4.34	B.
March	291	26	41.5	2.53	2.92	A.
April	33	19	24.3	1.48	1.65	A.
May	136	18	27.1	1.65	1.90	A.
June	28	13	16.3	.994	1.11	B.
July	398	10	31.6	1.93	2.22	B.
August	103	10	16.6	1.01	1.16	B.
September	20	10	10.8	.659	.74	B.
October	36	9	12.8	.780	.90	B.
November	19	11	13.3	.811	.90	B.
December	39	11	14.4	.878	1.01	B.
The year	509	9	26.7	1.63	22.10	

NOTE.—Discharge during January 24 to February 28, 1907, estimated on the basis of climatological reports and comparisons of the discharge of eastern Maryland stations. Discharge, January 24 to 31, 1907, 18 second-feet.

DEER CREEK NEAR CHURCHVILLE, MD.

Deer Creek rises in southern part of York County, Pa., and flows southeastward into the Susquehanna near Stafford, Harford County, Md. It is about 35 miles long and drains an area of 128 square miles.

The gaging station is located at the highway bridge about 3 miles north of Churchville. All tributaries in the vicinity of the station are unimportant. The station is located about 1 mile above Coolbranch Run and about 8 miles above the junction of Deer Creek with the Susquehanna. It was established December 14, 1904, and was discontinued March 31, 1909. The observer was paid by the Maryland state weather service.

This station was established to determine the regimen of flow of Deer Creek for power purposes.

The datum of the chain gage has not been changed since the establishment of the station. The discharge is often affected by ice during the winter period. Conditions of flow have remained constant during the maintenance of the station and an excellent low-water rating curve has been developed.

Daily gage height, in feet, of Deer Creek near Churchville, Md., for 1907–8.

[R. H. Archer, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	2.55	2.05	2.00	2.05	1.95	1.90	1.95	2.25	1.65	2.15	1.90	2.25
2	2.22	2.15	3.82	2.00	1.95	3.25	1.90	1.95	1.70	2.05	1.92	2.10
3	2.12	2.25	2.85	2.00	1.95	2.25	1.85	1.95	1.65	2.00	3.10	2.20
4	2.52	2.05	2.25	2.00	2.00	2.00	1.80	1.98	1.65	2.00	2.08	2.15
5	2.18	1.80	2.20	2.00	2.00	2.40	1.80	1.78	1.70	2.35	2.00	2.20
6	2.10	2.45	2.30	2.00	2.00	2.20	1.80	1.82	1.70	2.02	2.00	2.15
7	2.08	2.40	2.10	2.00	2.10	1.95	2.05	1.75	1.60	1.95	3.90	2.20
8	2.05	2.35	2.10	2.35	1.95	2.10	1.88	1.70	1.70	2.28	2.42	2.05
9	2.25	2.40	2.40	2.52	2.15	2.05	1.85	3.08	1.70	2.02	2.30	3.95
10	2.20	2.25	2.10	2.30	2.00	2.00	1.80	2.05	1.70	1.95	2.20	3.65
11	2.05	2.20	2.20	2.20	2.05	2.02	1.90	1.90	1.68	1.95	2.40	2.65
12	2.28	2.30	2.20	2.08	2.00	2.08	2.15	1.80	1.98	1.90	2.15	2.30
13	2.35	2.35	4.05	2.02	1.95	1.98	1.85	1.70	1.75	1.90	2.12	1.85
14	2.45	2.25	3.95	2.00	1.92	2.15	1.80	1.70	1.70	1.90	2.00	3.02
15	2.35	2.30	2.85	2.00	1.88	2.00	1.75	1.70	1.65	1.90	2.00	2.97
16	2.25	2.20	2.55	2.00	2.02	1.95	1.75	1.70	1.65	1.85	2.00	2.75
17	2.30	2.15	2.50	2.02	1.98	1.90	1.90	1.70	1.65	1.85	2.00	2.63
18	2.20	2.10	2.50	1.98	1.95	1.90	2.42	1.75	2.35	1.85	2.05	2.50
19	2.20	2.25	3.10	1.95	2.70	1.90	2.25	1.70	1.75	1.85	2.32	2.50
20	3.00	2.25	2.85	1.95	1.98	1.90	1.85	1.70	1.90	1.85	2.50	2.30
21	2.35	2.05	2.45	1.95	1.95	1.95	1.80	1.70	1.70	1.85	2.25	2.30
22	2.20	2.10	2.40	1.95	1.95	1.90	1.75	1.88	1.65	1.85	2.15	2.25
23	2.10	2.10	2.30	2.12	1.88	1.85	1.70	1.70	5.45	1.85	2.15	4.27
24	2.15	2.10	2.25	2.70	2.00	1.85	1.70	2.80	2.72	1.85	4.40	2.75
25	2.10	2.25	2.20	2.10	1.92	1.82	1.70	1.90	2.52	1.85	3.80	2.75
26	2.20	2.25	2.20	2.00	2.05	1.80	1.70	1.75	2.02	1.85	3.10	2.50
27	2.00	2.00	2.20	2.00	2.20	1.80	1.70	1.70	1.95	1.80	2.50	2.45
28	2.15	2.15	2.20	2.00	2.00	1.88	1.70	1.70	1.92	1.90	2.30	2.40
29	2.05	.....	2.15	2.00	2.00	2.05	1.70	1.70	4.00	2.12	2.30	2.55
30	2.08	.....	2.10	2.00	1.92	2.40	1.80	1.70	2.45	2.00	2.20	2.42
31	2.00	.....	2.05	.....	1.90	.....	1.72	1.70	.....	1.90	.....	2.40
1908.[b]												
1	2.35	3.83	2.50	2.55	2.10	2.10	1.70	1.60	1.65	1.72	1.88	1.72
2	2.37	2.52	2.60	2.42	2.00	2.08	1.68	1.60	1.65	1.65	1.82	1.70
3	2.32	2.50	2.52	2.35	2.15	2.05	1.85	1.60	1.65	1.60	1.78	1.70
4	2.30	2.32	2.55	2.25	2.05	2.00	1.78	1.60	1.65	1.60	1.72	1.70
5	2.25	2.33	2.45	2.25	2.15	1.95	1.72	2.08	1.65	1.60	1.78	1.70
6	2.25	5.35	2.55	2.20	2.30	1.90	1.75	1.80	2.00	1.60	1.75	1.72
7	2.65	5.35	2.55	2.25	5.30	1.90	1.75	2.00	1.72	1.60	1.70	2.32
8	2.97	4.15	3.07	2.25	2.90	1.90	1.95	1.98	1.65	1.60	1.70	2.00
9	2.50	4.20	3.30	2.27	2.75	1.90	1.70	1.78	1.65	1.60	1.70	1.80
10	2.53	4.40	2.95	2.42	2.35	1.85	1.70	1.70	1.65	1.60	1.65	1.82
11	2.38	4.45	2.52	2.30	2.20	1.85	1.65	1.70	1.65	1.65	1.65	1.75
12	4.30	4.42	2.55	2.25	2.10	1.85	1.60	1.65	1.65	1.60	1.65	2.12
13	2.95	4.07	2.50	2.17	2.07	1.85	1.60	1.60	1.65	1.60	1.60	1.92
14	3.10	2.90	2.55	2.18	1.95	1.80	1.70	1.60	1.60	1.60	1.60	1.80
15	2.52	4.23	2.45	2.37	2.10	1.82	1.75	1.65	1.60	1.60	1.60	1.80
16	2.53	2.75	2.50	2.25	2.18	2.28	1.68	1.60	1.60	1.60	1.60	1.75
17	2.45	2.60	2.45	2.17	2.20	1.88	1.60	1.72	1.60	1.55	1.75	1.80
18	2.47	2.45	2.47	2.10	2.18	1.80	1.60	2.30	1.60	1.55	1.80	2.08
19	2.40	2.45	2.40	2.35	2.80	1.80	1.58	1.75	1.60	1.55	1.95	2.00
20	2.45	2.80	2.45	2.18	2.45	1.80	1.55	1.68	1.60	1.55	2.05	1.88
21	2.40	2.53	2.40	2.15	3.25	1.80	1.55	1.62	1.60	1.55	1.92	1.80
22	2.45	2.42	2.45	2.10	2.90	1.80	2.9	1.55	1.60	1.55	1.85	1.80
23	2.35	2.40	2.30	2.15	2.40	1.80	2.1	1.55	1.60	1.55	1.80	1.80
24	2.35	2.35	2.35	2.10	2.28	1.88	1.78	1.55	1.60	1.55	1.80	1.80
25	2.30	2.35	2.30	2.15	2.10	1.80	6.80	1.60	1.60	1.95	1.80	1.92
26	2.33	10.50	2.45	2.05	2.30	1.80	2.90	5.02	1.60	5.30	1.78	1.85
27	2.55	3.15	2.50	2.10	2.10	1.70	2.05	2.55	1.60	2.50	1.78	1.85
28	2.40	2.95	2.40	2.00	2.10	1.70	1.88	1.80	1.60	2.12	1.78	1.80
29	2.35	2.75	2.55	2.05	2.10	1.70	1.75	1.70	2.80	2.10	1.75	1.90
30	2.25	.....	2.55	2.05	2.18	1.70	1.7	1.70	1.90	2.30	1.72	1.90
31	2.20	.....	2.60	.....	2.12	.....	1.62	1.70	.....	1.95	.....	2.00

[a] Ice conditions prevailed from about January 24 to February 28, 1907.
[b] Ice conditions prevailed from about February 6 to 13, 1908.

Rating table for Deer Creek near Churchville, Md., for 1904–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	72	2.70	445	3.90	1,210	5.20	2,380
1.60	87	2.80	495	4.00	1,290	5.40	2,590
1.70	105	2.90	550	4.10	1,370	5.60	2,810
1.80	126	3.00	605	4.20	1,450	5.80	3,030
1.90	150	3.10	665	4.30	1,535	6.00	3,260
2.00	178	3.20	725	4.40	1,620	7.00	4,460
2.10	209	3.30	790	4.50	1,710	8.00	5,760
2.20	242	3.40	855	4.60	1,800	9.00	7,060
2.30	277	3.50	920	4.70	1,890	10.00	8,460
2.40	315	3.60	990	4.80	1,985		
2.50	355	3.70	1,060	4.90	2,080		
2.60	400	3.80	1,135	5.00	2,180		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 6 discharge measurements made during 1904–1906 and is well defined between gage heights 1.5 feet and 3.5 feet.

Monthly discharge of Deer Creek near Churchville, Md., for 1907–8.

[Drainage area, 141 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	605	.....	240	1.70	1.96	A.
February	.....	.....	180	1.28	1.33	D.
March	1,330	178	394	2.79	3.22	A.
April	445	164	204	1.45	1.62	A.
May	445	145	183	1.30	1.50	A.
June	758	126	200	1.42	1.58	A.
July	323	105	142	1.01	1.16	A.
August	653	105	156	1.11	1.28	A.
September	2,650	87	272	1.93	2.15	B.
October	296	126	166	1.18	1.36	A.
November	1,620	150	372	2.64	2.94	A.
December	1,510	138	420	2.98	3.44	A.
The year	2,650	87	244	1.73	3.54	
1908.						
January	1,540	242	383	2.72	3.14	A.
February	8,460	.....	718	5.08	5.48	C.
March	790	277	379	2.69	3.10	A.
April	378	178	249	1.77	1.98	A.
May	2,480	164	359	2.55	2.94	B.
June	270	105	145	1.03	1.15	A.
July	4,220	80	274	1.94	2.24	B.
August	2,200	80	189	1.34	1.54	B.
September	495	87	110	.780	.87	A.
October	2,480	80	192	1.36	1.57	B.
November	194	87	119	.844	.94	A.
December	285	105	142	1.01	1.16	A.
The year	8,460	80	272	1.93	26.11	

NOTE.—Discharge during the frozen periods 1907–8 estimated on the basis of climatological reports and intercomparison of data on stream flow collected at eastern Maryland stations:

	Second-feet.
Discharge January 24 to 31, 1907	142
February 6 to 13, 1908	312

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous measurements were made in Susquehanna River drainage basin in 1907:

Miscellaneous measurements made in Susquehanna River drainage basin.

Date.	Stream.	Locality.	Width.	Area of section.	Gage height.	Discharge.
			Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 24	Frankstown Branch Juniata River.	Covered bridge at Huntingdon, Pa.	249	601	[a] 3.26	425
October 12	do	Bridge 2,000 feet above railroad station.	226	567	[a] 3.22	360
July 26 [b]	Raystown Branch Juniata River.	At Hawn's bridge near Huntingdon, Pa.	136	250		323
October 12	do	do	184	308		232

[a] Weather Bureau gage at covered bridge near railroad station.
[b] Measurement by wading below bridge.

GUNPOWDER RIVER DRAINAGE BASIN.

DESCRIPTION.

The headwaters of Gunpowder River lie in York County, Pa., near the Maryland line. Thence the river flows southeastward through Baltimore County, Md., and empties into Chesapeake Bay about 10 miles northeast of Baltimore. The river, though small, has steep slopes, and the powers have considerable value on account of their proximity to a large city. A portion of the water supply for Baltimore is taken from this river at Loch Raven, and the city has purchased all the power rights below this place. Little Gunpowder Falls, which is tributary below the fall line, has the same general characteristics as the larger river. Throughout its entire length it forms the boundary between Harford and Baltimore counties, Md. There are several small power developments.

GUNPOWDER FALLS AT GLENCOE, MD.

This station is located at a steel highway bridge near the Pennsylvania Railroad station at Glencoe. It is about three-fourths of a mile above Piney Creek, which enters Gunpowder Falls from the west. It was established December 15, 1904, and was discontinued March 31, 1909. The observer was paid by the Maryland state weather service.

This station was established to determine the regimen of flow of Gunpowder Falls for power purposes. Between 50 and 60 second-feet are continuously diverted from this stream above Glencoe for the water supply of Baltimore, Md.

The datum of the chain gage has remained constant since the establishment of the station. The discharge is sometimes affected by ice conditions during the winter months. Conditions of flow are liable to change at this station. A good rating curve has been developed for low stages.

The following discharge measurement was made May 20, 1908: Width, 72 feet; area, 166 square feet; gage height, 2.51 feet; discharge, 304 second-feet.

Daily gage height, in feet, of Gunpowder Falls at Glencoe, Md., for 1907–8.

[Samuel Wilhelm, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	2.72	4.80	.....	2.20	2.02	1.88	1.90	2.48	1.42	2.00	1.80	2.38
2	2.38	4.75	8.60	2.10	2.00	3.62	1.80	1.80	1.62	1.90	2.22	2.38
3	2.25	3.02	3.15	2.10	1.95	2.45	1.72	1.75	1.48	2.05	3.00	2.25
4	2.60	2.28	2.70	2.10	2.02	2.20	1.68	1.90	1.72	1.90	2.28	2.25
5	2.20	3.90	2.58	2.10	2.05	2.35	1.60	1.75	1.65	1.90	2.12	2.22
6	2.15	3.90	2.42	2.02	2.10	2.22	1.60	1.80	1.50	1.92	2.05	2.15
7	2.15	3.90	2.35	2.05	2.10	2.05	5.30	1.72	1.45	1.90	3.20	2.12
8	2.75	4.15	2.38	2.45	2.00	2.10	2.02	1.62	1.40	2.30	2.35	2.18
9	2.62	.....	2.52	2.62	2.42	1.98	1.90	1.95	1.50	2.08	2.20	2.20
10	2.28	.....	2.45	2.45	2.12	1.92	1.80	1.85	1.55	1.88	2.42	4.90
11	2.18	.....	2.38	2.28	2.05	2.10	7.00	1.70	4.82	1.82	2.38	3.18
12	2.55	5.55	2.15	2.15	2.02	2.18	3.30	1.65	2.25	1.80	2.22	2.75
13	2.50	.....	5.70	2.15	1.98	2.00	2.42	1.60	1.78	1.72	2.10	2.60
14	2.65	.....	4.20	2.10	1.90	2.00	2.12	1.55	1.55	1.72	2.00	3.98
15	2.45	3.45	3.38	2.08	1.88	2.00	2.00	1.52	1.50	1.72	1.98	3.58
16	2.48	.....	2.95	2.00	1.82	1.85	1.95	1.42	1.55	1.70	1.95	3.22
17	2.38	.....	2.82	2.00	1.88	1.80	1.92	1.48	1.50	1.70	1.95	3.00
18	2.38	3.5	2.90	2.00	1.82	1.80	2.30	1.50	1.60	1.70	2.02	2.88
19	2.38	.....	3.38	2.00	1.85	1.75	1.95	1.50	1.60	1.65	2.78	2.78
20	3.48	.....	3.45	2.00	2.30	1.70	1.95	1.50	1.50	1.65	2.32	2.60
21	2.70	2.95	2.90	1.90	1.90	2.45	1.80	1.48	1.52	1.65	2.38	2.58
22	2.40	.....	2.70	1.90	1.82	1.88	1.78	1.55	1.68	1.65	2.30	2.60
23	2.20	.....	2.70	2.15	1.80	1.70	1.75	1.50	5.30	1.65	2.20	6.25
24	3.60	.....	2.60	3.32	1.85	1.72	1.75	3.28	3.22	1.60	4.55	3.40
25	5.00	3.5	2.50	2.25	1.85	1.70	1.70	2.15	2.25	1.60	3.50	2.98
26	4.25	.....	2.38	2.15	1.92	1.65	1.70	1.68	1.95	1.62	3.15	2.90
27	4.85	.....	2.40	2.20	2.22	1.60	1.70	1.60	1.90	1.62	2.88	2.80
28	5.35	3.15	2.35	2.05	2.05	1.58	1.65	1.55	1.80	2.40	2.62	2.75
29	4.90	.....	2.30	2.05	1.90	2.35	1.82	1.52	3.48	3.05	2.50	2.70
30	5.10	.....	2.28	2.05	1.82	2.25	1.75	1.50	2.35	2.20	2.30	2.82
31	5.25	.....	2.20	.....	1.80	.....	1.65	1.48	.....	1.90	.....	2.78
1908.[b]												
1	2.55	5.43	2.97	2.70	2.05	2.00	1.55	1.90	1.70	1.70	2.00	1.80
2	2.53	2.60	3.07	2.65	2.07	2.00	1.55	1.82	1.70	1.90	1.92	1.78
3	2.45	2.63	3.05	2.47	2.05	2.00	1.55	1.78	1.65	1.72	1.90	1.68
4	2.43	2.35	2.83	2.43	2.05	1.95	1.55	1.75	1.62	1.70	1.85	1.72
5	2.45	3.13	2.75	2.43	2.25	1.95	1.52	1.98	1.60	1.60	1.80	1.75
6	2.33	6.35	3.37	2.40	2.65	1.95	1.50	2.60	2.18	1.60	1.80	1.75
7	2.93	5.20	5.75	2.40	5.15	1.92	1.50	1.90	1.78	1.60	1.80	2.05
8	2.95	5.35	3.37	2.50	3.23	1.90	1.75	2.25	1.72	1.60	1.80	1.92
9	2.75	5.75	3.75	2.50	2.75	1.90	1.50	2.05	1.60	1.60	1.80	1.82
10	2.43	5.75	3.13	2.35	2.53	1.90	1.50	1.92	1.60	1.60	1.80	1.75
11	2.35	6.40	2.97	2.40	2.35	1.85	1.50	1.85	1.55	1.60	1.80	1.70
12	7.70	5.85	2.95	2.35	2.30	1.85	1.45	1.80	1.60	1.60	1.80	1.88
13	3.90	7.10	2.93	2.27	2.25	1.85	1.45	1.78	1.55	1.60	1.80	1.82
14	3.20	4.73	2.87	2.27	2.25	1.80	1.45	1.70	1.55	1.60	1.78	1.80
15	2.95	7.85	2.87	2.43	2.37	1.95	1.45	1.68	1.58	1.60	2.05	1.82
16	2.85	3.43	2.75	2.40	2.35	2.18	1.40	1.65	1.55	1.60	1.85	1.80
17	2.73	2.93	2.67	2.25	2.33	1.95	1.40	1.72	1.55	1.60	1.85	1.88
18	2.65	2.67	2.70	2.25	2.23	1.85	1.38	2.22	1.55	1.55	2.00	2.00
19	2.60	3.05	2.87	2.40	2.23	1.80	1.35	1.85	1.55	1.55	1.98	1.95
20	2.55	3.05	2.65	2.33	2.60	1.80	1.35	1.70	1.58	1.55	1.95	1.85
21	2.55	2.80	2.55	2.20	3.30	1.75	1.35	1.65	1.50	1.55	1.92	1.88
22	2.55	2.65	2.55	2.15	2.85	1.70	4.75	1.68	1.55	1.55	1.80	1.85
23	2.53	2.55	2.63	2.15	2.68	1.70	2.05	1.70	1.55	1.55	1.80	2.02
24	2.45	2.47	2.60	2.15	2.45	1.62	3.52	1.70	1.60	1.58	1.80	2.70
25	2.53	2.35	2.55	2.20	2.38	1.60	7.65	1.70	1.58	2.68	1.80	2.90
26	2.43	11.05	2.50	2.15	2.32	1.60	2.75	5.20	1.52	6.05	1.80	2.75
27	2.87	4.03	2.45	2.15	2.20	1.60	2.78	2.28	1.60	2.20	1.78	2.78
28	2.47	3.30	2.50	2.10	2.15	1.55	2.35	2.02	1.70	2.05	1.72	2.88
29	2.45	3.05	2.73	2.05	2.15	1.55	2.10	1.90	2.90	2.02	1.75	2.72
30	2.20	.....	2.57	2.07	2.10	1.55	2.00	1.85	1.90	2.22	1.75	2.48
31	3.70	.....	2.80	.....	2.00	.....	1.95	1.72	.....	2.02	.....	1.72

[a] Ice conditions prevailed from about January 24 to March 1, 1907, except February 3 and 4.
[b] Discharge affected by ice conditions January 31, February 1, February 5 to 13, and December 23 to 30, 1908.

Rating table for Gunpowder Falls at Glencoe, Md., for 1906–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.30	65	2.80	375	4.30	955	6.60	2,300
1.40	77	2.90	407	4.40	1,000	6.80	2,440
1.50	90	3.00	440	4.50	1,050	7.00	2,580
1.60	104	3.10	475	4.60	1,100	7.20	2,720
1.70	119	3.20	510	4.70	1,150	7.40	2,860
1.80	135	3.30	545	4.80	1,200	7.60	3,000
1.90	152	3.40	580	4.90	1,255	7.80	3,140
2.00	170	3.50	620	5.00	1,310	8.00	3,280
2.10	190	3.60	660	5.20	1,420	9.00	4,000
2.20	212	3.70	700	5.40	1,530	10.00	4,740
2.30	235	3.80	740	5.60	1,650	11.00	5,490
2.40	260	3.90	780	5.80	1,770	12.00	6,250
2.50	286	4.00	820	6.00	1,900		
2.60	314	4.10	865	6.20	2,030		
2.70	344	4.20	910	6.40	2,160		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 5 discharge measurements made during 1905–1908, and is well defined between gage heights 1.8 feet and 5 feet.

Monthly discharge of Gunpowder Falls at Glencoe, Md., for 1907–8.

[Drainage area, 160 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	612	.....	250	1.91	2.20	B.
February	.....	.....	192	1.54	1.60	D.
March	3,800	.....	505	3.50	4.04	B.
April	552	152	209	1.65	1.84	B.
May	265	135	167	1.39	1.60	B.
June	668	101	186	1.51	1.68	B.
July	2,580	104	280	2.09	2.41	B.
August	538	80	131	1.16	1.34	C.
September	1,480	77	231	1.79	2.00	B.
October	457	104	153	1.30	1.50	B.
November	1,080	135	296	2.19	2.44	B.
December	2,060	194	447	3.14	3.62	B.
The year	3,800	77	254	1.93	26.27	
1908.						
January	3,070	200	417	2.95	3.40	B.
February	5,530	.....	656	4.44	4.79	B.
March	1,740	273	433	3.05	3.52	B.
April	344	180	242	1.86	2.08	B.
May	1,390	170	299	2.21	2.55	B.
June	208	97	106	1.01	1.13	C.
July	3,040	71	270	2.03	2.34	B.
August	1,420	111	191	1.54	1.78	B.
September	407	90	119	1.09	1.22	C.
October	1,930	97	186	1.51	1.74	B.
November	180	122	142	1.23	1.37	C.
December	180	.....	130	1.16	1.34	C.
The year	5,530	71	266	2.01	27.26	

NOTE.—The first three columns give the actual discharge past the Glencoe station. The last two columns include the diversion of 55 second-feet (value approximate) to obtain the actual discharge per square mile and run-off depth in inches from the drainage basin as a whole. See description.

The discharge during the frozen periods is based on climatological reports and an intercomparison of eastern Maryland stations.

	Second-feet.
Discharge January 24 to 31, 1907	154
March 1, 1907	200
January 31, 1908	200
February 1, 1908	500
February 5 to 13, 1908	241
December 23 to 30, 1908	102

LITTLE GUNPOWDER FALLS NEAR BELAIR, MD.

This station is located at a steel highway bridge on the road from Belair to Kingsville. It is about 5 miles southwest of Belair. Wildcat Branch enters the stream from the north about one-half mile below the station. It was established December 13, 1904, and was discontinued March 31, 1909. The observer was paid by the Maryland state weather service.

This station was established to determine the regimen of flow of Little Gunpowder Falls for power purposes.

The datum of the chain gage has remained constant since the establishment of the station. The discharge is sometimes affected by ice conditions during the winter period. Conditions of flow are liable to change. A fairly good rating curve has been developed for low stages.

The following discharge measurement was made May 22, 1908: Width, 42 feet; area, 60 square feet; gage height, 1.92 feet; discharge, 84.4 second-feet.

Daily gage height, in feet, of Little Gunpowder Falls near Belair, Md., for 1907–8.

[George Unkart, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.06	1.84	1.78	1.78	1.70	1.74	1.68	1.82	1.36	1.66	1.50	1.86
2	1.86	1.95	4.36	1.76	1.72	2.89	1.52	1.56	1.44	1.58	1.70	1.84
3	1.86	1.99	2.44	1.81	1.73	1.91	1.50	1.82	1.44	1.69	1.88	1.82
4	2.29	1.78	1.90	1.82	1.78	1.72	1.58	1.70	1.45	1.71	1.70	1.83
5	1.89	1.82	2.08	1.82	1.70	2.31	1.48	1.48	1.28	1.78	1.62	1.80
6	1.82	2.28	2.26	1.78	1.79	1.86	1.42	1.59	1.39	1.60	1.68	1.74
7	1.81	2.52	1.88	1.86	1.78	1.84	2.33	1.48	1.40	1.60	2.58	1.78
8	3.12	2.52	1.99	1.98	1.66	1.78	1.60	1.46	1.40	1.72	1.88	1.83
9	2.15	2.68	2.00	2.20	1.90	1.72	1.48	1.88	1.46	1.56	1.80	3.35
10	1.85	2.20	1.98	1.94	1.70	1.68	1.56	1.61	1.34	1.58	1.90	2.16
11	1.81	1.94	1.88	1.94	1.65	1.84	1.62	1.54	1.62	1.58	1.78	2.02
12	2.08	2.32	1.85	1.89	1.66	1.81	1.78	1.46	1.48	1.58	1.66	1.84
13	1.96	2.38	4.18	1.69	1.68	1.72	1.62	1.38	1.41	1.55	1.68	3.22
14	2.16	2.13	2.89	1.80	1.62	1.84	1.56	1.42	1.38	1.56	1.63	4.30
15	1.99	2.02	2.35	1.72	1.64	1.74	1.52	1.42	1.36	1.52	1.64	2.46
16	1.94	1.95	2.11	1.68	1.78	1.68	1.52	1.38	1.40	1.52	1.62	2.18
17	1.95	1.90	2.11	1.70	1.74	1.62	1.60	1.35	1.42	1.56	1.63	2.06
18	1.96	2.01	2.10	1.66	1.60	1.58	1.77	1.42	1.48	1.49	1.70	2.04
19	1.98	1.91	2.55	1.75	1.68	1.60	1.72	1.41	1.41	1.52	2.06	1.96
20	2.60	1.88	2.39	1.88	1.90	1.64	1.71	1.49	1.40	1.52	1.80	1.98
21	2.05	1.81	2.08	1.74	1.74	1.81	1.56	1.47	1.42	1.52	1.92	1.96
22	1.94	1.74	2.01	1.74	1.66	1.65	1.52	1.44	1.46	1.56	1.84	1.90
23	1.88	1.82	1.99	1.88	1.64	1.60	1.50	1.46	3.31	1.55	1.78	3.35
24	2.04	1.91	1.94	2.86	1.64	1.58	1.49	2.19	2.02	1.48	4.12	2.25
25	2.07	2.10	1.88	1.81	1.66	1.60	1.57	1.52	1.92	1.48	2.54	2.06
26	1.88	1.94	1.88	1.82	1.76	1.59	1.36	1.53	1.65	1.65	2.24	2.05
27	2.00	1.75	1.86	1.68	2.32	1.54	1.48	1.48	1.66	1.52	2.04	2.00
28	2.19	1.88	1.89	1.76	1.84	1.54	1.45	1.50	3.34	1.90	1.95	1.96
29	2.42	.....	1.85	1.76	1.64	1.99	1.46	1.42	3.00	1.69	1.86	1.96
30	2.10	.....	1.79	1.70	1.62	1.89	1.48	1.36	1.88	1.54	1.86	2.26
31	1.98	.....	1.82	.....	1.59	.....	1.52	1.50	.....	1.64	.....	2.11
1908.[b]												
1	1.97	3.24	1.99	1.98	1.75	1.58	1.35	1.32	1.35	1.41	1.56	1.40
2	1.97	2.10	2.18	1.92	1.69	1.62	1.32	1.32	1.26	1.48	1.54	1.48
3	2.02	2.24	2.08	1.86	1.67	1.45	1.34	1.29	1.30	1.38	1.45	1.44
4	1.93	2.40	1.94	1.88	1.66	1.55	1.25	1.26	1.41	1.38	1.52	1.32
5	1.97	2.53	1.96	1.83	1.75	1.48	1.40	1.42	1.30	1.32	1.54	1.49
6	1.88	2.72	2.22	1.88	1.91	1.56	1.37	1.39	1.85	1.38	1.45	1.42
7	3.14	2.38	3.09	1.82	2.77	1.55	1.41	1.30	1.38	1.26	1.49	1.86
8	2.30	2.66	2.22	1.93	2.08	1.45	1.50	1.92	1.36	1.34	1.42	1.59
9	2.09	2.98	2.43	1.84	1.95	1.56	1.38	1.61	1.41	1.40	1.54	1.50
10	2.02	3.10	2.13	1.82	1.83	1.52	1.36	1.38	1.30	1.38	1.40	1.48
11	2.00	2.60	2.06	1.88	1.73	1.42	1.32	1.26	1.34	1.34	1.45	1.56
12	4.00	2.02	2.08	1.80	1.72	1.46	1.31	1.36	1.36	1.34	1.50	1.82
13	2.42	3.29	2.06	1.73	1.69	1.48	1.36	1.25	1.34	1.38	1.34	1.58
14	2.16	3.22	2.00	1.77	1.79	1.48	1.28	1.36	1.35	1.22	1.42	1.52
15	2.10	3.27	1.99	1.77	1.78	2.36	1.25	1.29	1.42	1.35	1.60	1.55
16	2.10	2.30	1.95	1.89	1.81	1.79	1.34	1.30	1.26	1.40	1.54	1.50
17	2.02	2.10	1.87	1.79	1.79	1.52	1.12	1.34	1.24	1.38	1.58	1.49
18	1.99	2.10	2.02	1.80	1.66	1.50	1.56	1.54	1.26	1.32	1.52	1.66
19	1.97	2.39	1.96	1.88	1.67	1.50	1.26	1.38	1.26	1.38	1.70	1.60
20	1.99	2.30	1.88	1.79	1.89	1.51	1.25	1.38	1.26	1.30	1.54	1.55
21	2.02	2.11	1.92	1.77	2.21	1.50	1.17	1.32	1.34	1.22	1.52	1.55
22	1.98	2.08	1.88	1.70	1.90	1.44	2.55	1.38	1.28	1.28	1.51	1.56
23	1.98	1.97	1.90	1.68	1.82	1.45	1.74	1.32	1.39	1.40	1.52	1.72
24	1.96	1.98	1.91	1.70	1.74	1.41	1.48	1.39	1.28	1.54	1.50	1.70
25	2.03	2.02	1.85	1.70	1.66	1.48	2.45	1.37	1.05	1.86	1.48	1.58
26	1.94	[a] 6.20	1.84	1.74	1.65	1.27	1.70	3.54	1.38	3.14	1.48	1.55
27	2.36	2.40	1.84	1.72	1.59	1.39	1.62	1.74	1.35	1.78	1.34	1.54
28	1.94	2.11	1.83	1.72	1.57	1.40	1.48	1.54	1.45	1.62	1.48	1.54
29	2.01	2.08	2.14	1.67	1.60	1.38	1.36	1.38	1.92	1.64	1.44	1.51
30	1.90	.....	1.94	1.68	1.60	1.36	1.33	1.43	1.42	1.88	1.39	1.62
31	2.12	.....	2.03	.....	1.62	.....	1.38	1.37	.....	1.62	.....	1.60

[a] Ice conditions prevailed from about January 24 to February 28, 1907.
[b] Ice conditions prevailed from about February 8 to 13, 1908.

Rating table for Little Gunpowder Falls near Belair, Md., for 1904–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet*	*Sec.-ft.*
1.00	12	2.10	119	3.20	367	4.40	725
1.10	15	2.20	136	3.30	394	4.60	800
1.20	19	2.30	155	3.40	422	4.80	880
1.30	26	2.40	175	3.50	450	5.00	970
1.40	34	2.50	195	3.60	480	5.20	1,060
1.50	43	2.60	216	3.70	510	5.40	1,160
1.60	53	2.70	239	3.80	540	5.60	1,260
1.70	64	2.80	263	3.90	570	5.80	1,370
1.80	76	2.90	288	4.00	600	6.00	1,480
1.90	89	3.00	314	4.20	660	6.20	1,600
2.00	103	3.10	340				

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 7 discharge measurements made during 1904–1908 and is well defined between gage heights 1.4 feet and 2.2 feet.

Monthly discharge of Little Gunpowder Falls near Belair, Md., for 1907–8.

[Drainage area, 43 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	345	.....	101	2.35	2.71	C.
February	.....	.....	60.0	1.40	1.46	D.
March	708	74	152	3.53	4.07	B.
April	278	60	84.2	1.96	2.19	B.
May	159	52	68.2	1.59	1.83	C.
June	286	47	77.2	1.80	2.01	B.
July	161	31	52.4	1.22	1.41	C.
August	134	30	47.9	1.11	1.28	C.
September	405	25	76.9	1.79	2.00	B.
October	89	41	52.8	1.23	1.42	C.
November	636	43	104	2.42	2.70	B.
December	690	69	151	3.51	4.05	B.
The year	690	25	85.6	1.99	27.13	
1908.						
January	600	86	134	3.12	3.60	B.
February	1,600	99	209	4.86	5.24	C.
March	337	80	113	2.63	3.03	B.
April	100	61	76.1	1.77	1.98	B.
May	256	50	78.2	1.82	2.10	B.
June	167	24	46.2	1.07	1.19	C.
July	206	16	43.9	1.02	1.18	C.
August	462	22	48.6	1.13	1.30	C.
September	92	13	32.3	.751	.84	C.
October	351	20	48.3	1.12	1.29	C.
November	64	29	42.5	.988	1.10	C.
December	84	28	49.3	1.15	1.33	C.
The year	1,600	13	76.8	1.79	24.18	

NOTE.—Estimates during frozen periods 1907–8 based on climatological reports and intercomparison of data collected at eastern Maryland gaging stations.

	Second-feet.
Discharge January 24 to 31, 1907	58
February 8 to 13, 1908	100

PATAPSCO RIVER DRAINAGE BASIN.

DESCRIPTION.

Patapsco River is formed by the junction of North Branch and South or Piney Branch, near Marriottsville, Md., and flows in a southeasterly direction into Chesapeake Bay, 13 miles south of Baltimore. Both branches rise in the central part of Maryland, and the whole basin, which has an area of about 350 square miles, lies within that State.

The drainage basin is hilly and largely under cultivation. It has no lakes or artificial reservoirs, and the flow of the stream is variable. The freshets do not, however, cause very large rises of the water because of the steep slope of the stream. The usual range of stage within a year is about 3 or 4 feet.

The bed is generally rock. The banks are of rock and very little of the land is subject to overflow. The Baltimore and Ohio Railroad follows the stream closely throughout nearly its entire length.

The river carries a small volume of water, but as it has considerable slope a large number of water powers have been developed along its course. These, though small, are made valuable by their proximity to Baltimore.

PATAPSCO RIVER AT WOODSTOCK, MD.

This station is located near the railroad station at Woodstock, Md., about 1½ miles below the junction of North and South branches. It was established August 6, 1896, and discontinued March 31, 1909. The observer was paid by the Maryland state weather service during 1907 and 1908.

The Patapsco has no important tributaries below the junction of North and South branches. The Patapsco is one of the oldest water-power streams in the United States, and much power has been developed in the vicinity of the fall line. The discharge data obtained on this river are chiefly of value in determining the regimen of flow for the further extension and development of water power.

The datum of the chain gage has remained the same since the establishment of the station. The discharge is frequently affected by ice during the winter period. Conditions of flow are relatively permanent although subject to change at times of extreme flood. A good rating curve has been developed.

Daily gage height, in feet, of Patapsco River at Woodstock, Md., for 1907–8.

[William Donovan, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	5.65	4.4	4.15	4.35	4.15	4.15	4.15	4.1	3.85	4.1	3.85	4.1
2	4.55	4.4	7.7	4.25	4.05	5.35	4.05	4.75	3.95	4.05	4.2	4.1
3	4.3	4.25	4.35	4.1	4.05	4.85	4.15	4.65	4.0	3.85	4.35	4.2
4	5.65	4.5	4.3	4.25	4.15	4.45	4.1	4.3	3.85	3.9	4.1	4.1
5	4.75	4.5	4.25	4.2	4.2	4.65	4.05	4.15	3.95	4.0	4.0	4.0
6	4.5	6.0	4.15	4.3	4.15	4.55	3.95	4.05	4.15	4.05	3.9	4.05
7	4.35	7.1	4.3	4.4	4.45	4.25	5.05	4.15	3.95	3.9	3.85	4.1
8	4.4	6.4	4.2	4.3	4.6	4.2	4.4	4.1	3.85	3.8	3.95	4.2
9	4.5	6.4	4.15	4.95	4.45	4.25	4.2	4.15	4.0	3.75	3.9	4.25
10	4.35	5.85	4.35	4.7	4.15	4.3	4.2	4.15	4.0	3.95	4.1	5.4
11	4.25	5.55	4.25	4.35	4.1	4.35	4.15	4.2	3.9	4.0	4.15	4.6
12	4.75	5.25	4.3	4.2	4.25	4.25	4.45	4.15	3.85	3.95	4.05	4.35
13	4.45	5.4	8.6	4.15	4.1	4.2	4.15	4.1	3.95	4.15	3.95	4.25
14	4.6	5.25	7.25	4.15	4.2	4.1	4.25	4.25	4.0	4.0	4.05	5.2
15	4.75	5.2	5.05	4.1	4.15	4.15	4.1	4.05	4.1	3.95	4.2	4.2
16	4.45	5.1	4.45	4.2	4.05	4.25	4.05	4.15	4.05	3.9	4.1	4.2
17	4.4	4.65	4.85	4.3	3.95	4.15	4.15	4.05	3.9	3.8	4.15	4.05
18	4.7	4.5	4.8	4.25	4.0	4.25	4.25	4.1	4.45	3.95	4.05	4.15
19	4.35	4.5	5.85	4.15	4.0	4.35	4.4	4.2	4.05	4.0	4.05	4.05
20	5.4	4.4	5.35	4.2	3.95	4.25	4.45	4.05	4.15	4.05	4.25	3.95
21	5.2	4.25	4.85	4.15	3.9	4.45	4.3	4.15	4.2	3.95	4.4	4.0
22	4.75	4.35	4.35	4.1	4.15	4.4	4.15	4.2	4.1	4.0	4.4	4.2
23	4.45	4.25	4.35	5.1	4.05	4.4	4.3	4.1	5.65	4.1	4.15	4.65
24	4.45	4.45	4.35	4.8	4.05	4.25	4.25	5.0	5.2	3.95	4.15	4.45
25	4.55	4.4	4.45	4.5	4.0	4.1	4.1	4.2	4.25	4.0	4.2	4.25
26	4.4	4.25	4.2	4.25	4.25	4.2	4.1	4.0	4.05	4.1	4.1	4.15
27	4.35	4.4	4.3	4.2	4.25	4.05	4.1	4.0	4.1	3.95	4.0	4.1
28	4.35	4.25	4.4	4.2	4.2	4.25	4.2	4.1	4.15	3.95	3.95	4.05
29	4.4	.....	4.35	4.15	4.15	4.35	4.25	4.0	6.05	4.1	4.05	4.1
30	4.3	.....	4.2	4.1	4.25	4.45	4.15	3.9	4.5	4.0	4.15	4.0
31	4.35	.....	.....	.....	4.05	.....	4.05	4.0	.....	3.9	.....	3.95
1908.[b]												
1	4.0	6.55	4.5	4.55	4.25	4.6	3.9	4.05	3.85	4.2	3.6	3.7
2	4.1	4.85	4.65	4.4	4.35	4.5	3.85	3.95	3.9	4.15	3.65	3.65
3	4.15	4.45	4.85	4.45	4.3	4.45	3.85	4.15	3.9	4.05	3.65	3.6
4	4.2	4.4	4.7	4.4	4.3	4.55	3.95	4.15	3.8	3.95	3.75	3.6
5	4.25	4.35	4.7	4.45	4.4	4.55	3.95	4.1	4.05	3.9	3.7	3.55
6	4.15	4.25	6.95	4.35	4.35	4.65	4.05	3.95	3.85	4.0	3.6	3.5
7	4.15	4.4	5.55	4.45	6.1	4.55	3.9	5.05	3.75	3.9	3.7	4.0
8	4.25	4.45	4.5	4.55	4.8	4.65	3.85	4.25	3.75	3.85	3.6	3.9
9	4.2	4.6	4.3	4.5	4.5	4.6	3.95	3.95	3.65	3.8	3.8	3.7
10	4.15	4.45	4.25	4.4	4.35	4.5	3.95	4.0	3.55	3.85	3.65	3.6
11	4.1	4.4	4.15	4.45	4.45	4.5	4.0	3.9	3.65	3.8	3.6	4.1
12	6.4	4.55	4.2	4.6	4.45	4.55	3.9	3.9	3.65	3.7	3.75	4.25
13	5.2	5.1	4.25	4.45	4.45	4.55	3.95	3.85	3.85	3.7	3.7	3.8
14	4.4	5.25	4.15	4.5	4.45	4.3	3.85	3.9	3.85	3.8	3.7	3.7
15	4.25	8.6	4.65	4.55	4.35	4.2	3.7	3.9	3.65	3.75	3.75	3.65
16	4.15	6.05	4.55	4.55	4.35	4.3	3.6	3.95	3.65	3.65	3.8	3.75
17	4.15	4.5	4.55	4.5	4.35	4.2	3.55	3.85	3.6	3.65	3.9	3.9
18	4.05	4.35	4.4	4.45	4.45	4.2	3.65	3.8	3.75	3.65	3.8	3.8
19	4.1	4.35	4.5	4.3	4.3	4.1	3.9	3.75	3.65	3.8	4.05	3.9
20	4.15	4.25	4.65	4.3	4.5	4.15	3.9	3.85	3.8	3.65	4.1	3.85
21	4.1	4.3	4.6	4.3	4.55	4.15	3.9	3.75	3.75	3.65	3.95	3.85
22	3.95	4.3	4.6	4.3	4.8	4.05	4.4	3.85	3.7	3.65	3.75	3.65
23	4.0	4.35	4.65	4.3	4.75	4.1	4.5	3.95	3.65	3.55	3.9	3.85
24	3.9	4.3	4.6	4.3	4.65	4.05	4.3	4.0	3.7	3.65	3.65	3.85
25	3.9	4.2	4.45	4.3	4.5	3.95	5.8	3.9	3.6	3.85	3.7	3.7
26	4.4	14.9	4.55	4.3	4.55	4.0	4.4	3.9	3.55	3.8	3.7	3.65
27	4.45	6.55	4.45	4.3	4.45	3.95	4.6	3.85	3.6	3.65	3.75	3.85
28	4.55	4.4	4.4	4.4	4.45	3.9	9.95	3.9	3.95	4.0	3.7	3.8
29	4.5	4.2	4.55	4.4	4.55	3.85	4.65	3.9	4.4	3.85	3.75	3.7
30	4.55	.....	4.45	4.3	4.55	3.8	4.5	3.9	4.2	3.75	3.75	3.75
31	4.45	.....	4.4	.....	4.55	.....	4.4	3.8	.....	3.65	.....	3.9

[a] Conditions of flow probably affected by ice conditions from about January 24 to February 28, 1907.
[b] Conditions of flow probably not materially affected by ice conditions during 1908.

Rating table for Patapsco River at Woodstock, Md., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.50	72	4.80	701	6.10	1,887	7.80	3,572
3.60	95	4.90	777	6.20	1,986	8.00	3,772
3.70	124	5.00	857	6.30	2,085	8.20	3,974
3.80	159	5.10	940	6.40	2,184	8.40	4,176
3.90	198	5.20	1,026	6.50	2,283	8.60	4,380
4.00	240	5.30	1,115	6.60	2,382	8.80	4,584
4.10	285	5.40	1,206	6.70	2,481	9.00	4,788
4.20	332	5.50	1,300	6.80	2,580	10.00	5,818
4.30	383	5.60	1,396	6.90	2,679	11.00	6,858
4.40	438	5.70	1,493	7.00	2,778	12.00	7,908
4.50	497	5.80	1,591	7.20	2,976	13.00	8,968
4.60	561	5.90	1,689	7.40	3,174	14.00	10,038
4.70	629	6.00	1,788	7.60	3,372	15.00	11,118

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 6 discharge measurements made during 1904–1908 and is well defined between gage heights 3.25 feet and 5 feet. Above 5 feet the curve is based on 3 high-water measurements and is fairly well defined to gage height 10 feet.

Monthly discharge of Patapsco River at Woodstock, Md., for 1907–8.

[Drainage area, 251 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	1,440	.....	559	2.23	2.57	A.
February	.....	.....	300	1.20	1.25	D.
March	4,380	308	811	3.23	3.72	A.
April	940	285	403	1.61	1.80	A.
May	561	198	309	1.23	1.42	A.
June	1,160	262	418	1.67	1.86	A.
July	898	219	347	1.38	1.59	A.
August	857	198	331	1.32	1.52	A.
September	1,840	179	383	1.53	1.71	A.
October	308	142	229	.912	1.05	A.
November	438	179	284	1.13	1.26	A.
December	1,210	219	372	1.48	1.71	A.
The year	4,380	142	396	1.58	21.46	
1908.						
January	2,180	198	418	1.67	1.92	A.
February	11,000	332	1,160	4.62	4.98	A.
March	2,730	308	597	2.38	2.74	A.
April	561	383	447	1.78	1.99	A.
May	1,890	358	528	2.10	2.42	A.
June	595	159	387	1.54	1.72	A.
July	5,770	84	488	1.94	2.24	A.
August	898	142	234	.932	1.07	A.
September	438	84	157	.625	.70	B.
October	332	84	165	.657	.76	B.
November	285	95	144	.574	.64	B.
December	358	72	156	.622	.72	B.
The year	11,000	72	407	1.64	21.90	

NOTE.—Discharge during the frozen period, January 24 to February 28, 1907, estimated on the basis of climatological reports and intercomparison of data on discharge collected at eastern Maryland stations. Discharge January 24 to 31, 1907, 325 second-feet.

POTOMAC RIVER DRAINAGE BASIN.

DESCRIPTION.

Potomac River is formed by the junction of its north and south branches, about 15 miles below Cumberland, Md., from which point it flows in a southeasterly direction into Cheaspeake Bay. For its entire length it forms the southern boundary of the State of Maryland and the northern boundary for the States of West Virginia and Virginia. It drains a total area of about 14,500 square miles.

North Branch of Potomac River rises in the Allegheny Mountains near the west corner of Maryland, and South Branch in the Alleghenies in Virginia and West Virginia. These branches, with their tributaries and the tributaries of the main stream, as far down as the Shenandoah, drain a series of narrow and generally fertile valleys lying between the parallel ranges which make up the system of the Alleghenies in this region. Their slopes are not, as a rule, very great, and their beds are of gravel and sand. The slopes of their drainage basins, however, are usually very steep, and after a rain, the water collects quickly in the rivers. There are few lowlands to be overflowed, and no lakes whatever in the region. Consequently these streams, and with them Potomac River, are subject to sudden and very heavy freshets in wet seasons, while in dry seasons their discharge becomes small.

The slopes of the tributary basin of Shenandoah River are in many instances steep, but the valley through which the Shenandoah flows is generally broader and more lands are subject to overflow. The slope of the river itself if usually greater than the slope of the tributaries above mentioned.

From the junction of its north and south branches below Cumberland, Md., the Potomac cuts through the mountains at nearly right angle. Its valley is narrow, its slope in many places great. The bed is generally gravel and bowlders, with ledge rock at small depth, which often appears at the surface. The banks are usually high and are not subject to overflow. It crosses the fall line a few miles above Washington and reaches tide water at Georgetown.

The Baltimore and Ohio Railroad follows the river for its entire length, and the Shenandoah Valley and the Cumberland Valley railroads cross the stream. The Chesapeake and Ohio Canal follows it from Cumberland to Georgetown.

As a water-power stream the principal disadvantage of the Potomac is the great variability of its flow. Good rock foundations for dams can generally be found at small depth, the banks are, as a rule, favorable, and there are several sites where large falls could be rendered available. A very insignificant amount of power has been developed.

The Great Falls of the Potomac, located about 15 miles above Washington, offers one of the best undeveloped power sites along Potomac River.

The surface-water resources of the Potomac River basin have been discussed in detail in Water-Supply Paper No. 192.

Gaging stations have been maintained in this basin as follows:

North Branch of Potomac River at Piedmont, W. Va. (1899–1906).
North Branch of Potomac River at Cumberland, Md. (1894–1897).
Potomac River at Great Cacapon, W. Va. (1894–1896).
Potomac River at Point of Rocks, Md. (1895–1908).
Savage River at Bloomington, Md. (1905–6).
Georges Creek at Westernport, Md. (1905–6).
Wills Creek near Cumberland, Md. (1905–6).
South Branch of Potomac River near Springfield, W. Va. (1894–1896, 1899–1906).
Opequan Creek near Martinsburg, W. Va. (1905–6).
Tuscarora Creek at Martinsburg, W. Va. (1905).
Antietam Creek near Sharpsburg, Md. (1897–1905).
South River at Basic City, Va. (1905–6).
South River at Port Republic, Va. (1895–1899).
South Fork of Shenandoah River near Front Royal, Va. (1899–1906).
Shenandoah River at Millville, W. Va. (1895–1908).
North River at Port Republic, Va. (1895–1899).
Lewis Creek near Staunton, Va. (1905–6).
Cooks Creek at Mount Crawford, Va. (1905–6).
Elk Run at Elkton, Va. (1905–6).
Hawksbill Creek near Luray, Va. (1905–6).
North Fork of Shenandoah River near Riverton, Va. (1899–1906).
Passage Creek at Buckton, Va. (1905–6).
Monocacy River near Frederick, Md. (1896–1908).
Rock Creek at Zoological Park, D. C. (1897–1900).
Rock Creek at Lyons Mill, D. C. (1892–1894).

POTOMAC RIVER AT POINT OF ROCKS, MD.

This station is located at the steel highway bridge at Point of Rocks, Md. It was established February 17, 1895.

The station has been maintained to obtain general statistical and comparative data regarding the flow of the Potomac River. In conjunction with the station on the Monocacy River near Frederick, Md., it is of particular value for determining the discharge available at the undeveloped power at Great Falls where the Potomac crosses the fall line with a fall of about 90 feet. The drainage area above these two stations is about 90 per cent of the drainage area at Great Falls, hence the discharge from the remaining 10 per cent can be estimated and added to the discharge at Point of Rocks plus that at Frederick without any appreciable error in the final resulting discharge at Great Falls. It will, however, be necessary to deduct the discharge of the Washington Acqueduct, amounting to about 101

second-feet per day. The intake of the acqueduct is immediately above the head of Great Falls on the Maryland side. The average diversion for 1907 was 65,910,000 gallons per day, and for 1908, 64,360,000 gallons per day.

Catoctin Creek enters Potomac River about one-third mile above the station from the Virginia side. Monocacy River enters from the Maryland side about 6 miles below the station. The Chesapeake and Ohio Canal parallels the Potomac on the Maryland side. The average discharge of the canal approximates from 75 to 100 second-feet and is not included in the discharges given in the tables below.

The conditions of flow at this station are practically permanent. The discharge is controlled by a rock ledge a few hundred feet below the station and extending completely across the river with the exception of one relatively unimportant channel. The discharge is rarely effected by ice conditions.

The datum of the chain gage has been maintained at a constant elevation since September 2, 1902. Prior to this date the datum was 0.45 foot higher than at present.

The present rating curve is considered very accurate and should require relatively little change in the future.[a] The observer at this point has been paid by the Maryland state weather service during 1907 and 1908.

Discharge measurements of Potomac River at Point of Rocks, Md., in 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907.					
March 15	R. H. Bolster	1,240	21,500	16.95	114,000
1908.					
January 14	Bolster and Henshaw	1,250	21,300	16.50	103,000
May 26	Follansbee and Walters	1,200	11,600	8.57	43,700

[a] Discharge data prior to 1907 have been revised and republished in Water-Supply Paper, U. S. Geological Survey No. 192.

Daily gage height, in feet, of Potomac River at Point of Rocks, Md., for 1907–8.

[George H. Hickman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.1	3.0	3.1	3.0	3.2	2.6	2.7	1.7	1.5	2.3	1.2	3.2
2	7.9	2.9	3.6	2.8	3.1	3.2	2.7	1.7	1.4	2.2	1.5	2.9
3	7.0	3.1	4.6	2.7	3.0	14.6	2.6	1.6	1.4	2.2	1.6	2.7
4	5.5	3.0	5.3	2.7	2.9	10.5	2.5	1.6	1.3	2.1	2.5	2.6
5	4.6	2.9	5.8	2.6	2.7	8.7	2.4	1.5	2.5	2.0	2.4	2.4
6	4.0	2.9	4.5	2.5	2.6	6.5	2.2	1.5	2.1	2.0	2.3	2.3
7	3.8	2.8	4.4	2.5	2.6	6.0	2.2	1.4	1.9	1.9	2.3	2.2
8	3.5	2.8	4.0	2.7	2.5	5.1	2.1	1.4	1.8	1.8	2.2	2.1
9	3.4	2.8	3.6	3.8	2.7	5.0	2.0	1.4	1.7	1.7	2.6	2.1
10	3.6	2.8	3.6	9.5	6.05	5.8	1.9	1.5	1.6	1.6	2.5	2.5
11	3.7	3.0	3.5	8.6	7.7	5.6	2.0	1.5	1.6	1.6	2.4	7.0
12	3.7	3.0	3.5	6.5	5.5	5.2	2.5	1.6	1.5	1.6	2.3	7.5
13	5.0	3.0	5.1	5.4	4.8	5.4	2.3	1.7	1.5	1.5	2.2	6.0
14	9.5	3.1	13.4	5.0	4.3	5.2	2.2	1.7	1.6	1.5	2.1	5.2
15	10.7	3.3	17.0	4.5	3.7	6.1	2.0	1.6	1.8	1.5	2.0	4.7
16	9.4	3.4	14.1	4.0	3.5	7.5	1.9	1.6	1.9	1.4	1.9	4.5
17	7.5	3.7	8.6	3.5	3.3	6.6	1.8	1.5	1.7	1.4	1.8	4.3
18	6.9	3.8	7.6	3.4	3.1	6.2	2.0	1.5	1.6	1.4	1.7	4.0
19	6.2	3.9	7.2	3.3	3.0	5.6	2.3	1.5	1.6	1.3	1.8	3.7
20	8.5	3.7	10.3	3.3	2.9	5.1	3.4	1.4	2.0	1.3	2.0	3.3
21	12.0	3.6	12.4	3.2	2.8	4.6	2.9	1.4	2.9	1.3	2.1	3.1
22	9.5	3.4	9.2	3.2	3.0	4.3	2.7	1.4	2.3	1.2	2.2	3.0
23	7.0	3.1	7.9	3.2	2.7	3.6	2.5	1.5	2.9	1.2	2.3	3.0
24	6.2	2.7	6.2	3.3	2.5	3.2	2.2	1.9	3.6	1.2	2.5	4.9
25	5.4	2.6	4.8	4.0	2.6	3.0	2.0	2.0	6.1	1.2	3.8	11.7
26	4.4	2.7	4.4	5.1	2.5	2.9	2.0	2.0	4.2	1.1	6.05	9.0
27	4.2	2.7	4.0	4.5	2.8	2.8	2.1	1.9	3.6	1.1	5.4	6.5
28	3.7	2.9	3.7	4.1	2.9	2.9	2.0	1.8	2.9	1.2	4.6	5.7
29	3.3	.....	3.5	3.8	2.8	2.8	2.0	1.7	2.6	1.2	4.0	5.0
30	3.1	.....	3.3	3.3	2.7	2.8	1.9	1.6	2.4	1.3	3.5	5.0
31	3.1	.....	3.1	.....	2.6	.....	1.8	1.5	.....	1.2	.....	5.4
1908.												
1	5.0	3.2	3.9	3.4	2.3	4.2	1.7	2.0	1.7	1.6	1.9	1.0
2	4.6	2.8	3.7	4.0	2.3	3.8	1.6	1.8	1.6	1.5	1.8	1.0
3	4.3	2.5	4.7	4.4	2.4	3.4	2.5	1.6	1.5	1.3	1.8	1.0
4	3.8	2.5	8.6	4.1	2.5	3.0	1.6	1.5	1.5	1.3	1.7	1.0
5	3.4	2.5	7.8	3.8	2.6	2.8	1.7	1.4	1.4	1.2	1.6	.9
6	3.3	2.6	8.0	3.7	5.8	3.5	1.7	1.4	1.4	1.2	1.5	.9
7	3.0	2.7	9.0	3.6	8.9	3.4	1.6	1.3	1.3	1.1	1.4	.8
8	2.8	2.8	11.4	3.4	15.0	3.0	1.6	1.3	1.2	1.1	1.3	.9
9	2.7	3.0	11.0	3.4	14.7	2.8	1.5	1.4	1.4	1.1	1.2	1.0
10	2.5	3.1	12.0	3.7	8.6	2.7	1.5	1.4	1.3	1.2	1.2	1.1
11	2.5	2.8	9.1	3.5	6.4	2.7	1.4	1.3	1.3	1.3	1.1	1.1
12	5.5	2.7	7.9	4.0	5.6	2.6	1.4	1.2	1.2	1.2	1.0	1.1
13	19.7	2.8	7.5	4.5	4.9	2.5	1.4	1.2	1.2	1.2	1.0	1.2
14	19.0	3.2	6.5	3.8	4.2	2.4	1.3	1.2	1.1	1.2	1.0	1.2
15	10.4	5.7	5.8	3.5	3.9	2.3	1.3	1.3	1.1	1.0	1.0	1.2
16	7.6	18.8	5.5	3.2	3.6	2.5	1.3	1.2	1.1	1.0	1.0	1.2
17	6.3	18.3	5.1	2.9	3.6	2.4	1.3	2.25	1.0	1.0	1.0	1.2
18	5.6	12.4	4.7	2.9	3.7	2.3	1.2	1.8	1.0	1.0	1.1	1.2
19	5.1	9.5	4.2	2.9	4.6	2.2	1.3	1.6	1.0	.9	1.1	1.1
20	4.5	5.7	7.6	2.7	5.8	2.2	1.3	1.5	.9	.9	1.1	1.2
21	4.2	5.0	7.4	2.7	10.9	2.1	1.3	1.5	.9	1.0	1.1	1.3
22	4.0	4.5	5.8	2.7	11.1	2.1	1.6	1.4	.9	1.0	1.1	1.3
23	4.2	4.1	5.0	2.5	18.1	2.0	2.0	1.3	.8	1.0	1.2	1.4
24	4.8	3.8	4.4	2.6	10.1	2.0	1.7	1.4	.8	1.0	1.2	1.5
25	5.2	3.4	4.2	2.5	8.4	2.0	1.7	1.5	.8	1.0	1.2	1.4
26	5.6	5.2	3.9	2.3	6.5	1.9	2.1	1.8	.8	2.2	1.2	1.4
27	5.0	5.9	3.4	2.4	5.5	1.9	2.5	2.8	.9	2.0	1.1	1.4
28	4.6	5.0	3.3	2.4	5.3	1.8	3.4	2.75	.9	1.8	1.1	1.3
29	4.3	4.1	3.3	2.2	4.8	1.8	3.4	2.4	1.6	1.7	1.1	1.3
30	3.9	.....	3.2	2.3	4.4	1.7	3.0	2.1	1.7	1.6	1.1	1.2
31	3.6	.....	3.4	.....	4.2	.....	3.4	1.9	.....	1.8	.....	1.2

Rating table for Potomac River at Point of Rocks, Md., for 1902–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	1,515	2.40	6,520	4.00	14,070	8.00	39,980
.90	1,750	2.50	6,920	4.20	15,150	9.00	47,600
1.00	2,000	2.60	7,330	4.40	16,270	10.00	55,600
1.10	2,260	2.70	7,750	4.60	17,430	11.00	63,900
1.20	2,530	2.80	8,180	4.80	18,610	12.00	72,200
1.30	2,810	2.90	8,620	5.00	19,820	13.00	80,500
1.40	3,100	3.00	9,070	5.20	21,060	14.00	88,800
1.50	3,400	3.10	9,530	5.40	22,300	15.00	97,100
1.60	3,700	3.20	10,000	5.60	23,560	16.00	105,400
1.70	4,010	3.30	10,480	5.80	24,840	17.00	113,700
1.80	4,330	3.40	10,970	6.00	26,140	18.00	122,000
1.90	4,670	3.50	11,470	6.20	27,460	19.00	130,300
2.00	5,020	3.60	11,980	6.40	28,780	20.00	138,600
2.10	5,380	3.70	12,490	6.60	30,100		
2.20	5,750	3.80	13,010	6.80	31,460		
2.30	6,130	3.90	13,530	7.00	32,820		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1902–1908 and is well defined between gage heights 1 foot and 14 feet. Above gage height 10 feet the rating curve is a tangent, the difference being 830 second-feet per tenth.

Monthly discharge of Potomac River at Point of Rocks, Md., for 1907–8

[Drainage area, 9,650 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	72,200	9,530	27,000	2.80	3.23	A.
February	13,500	7,330	9,560	.991	1.03	A.
March	114,000	9,530	30,500	3.16	3.64	A.
April	51,600	6,920	14,900	1.54	1.72	A.
May	37,800	6,920	11,100	1.15	1.33	A.
June	93,800	7,330	23,200	2.40	2.68	A.
July	11,000	4,330	6,010	.623	.72	A.
August	5,020	3,100	3,710	.384	.44	A.
September	26,800	2,810	6,430	.666	.74	A.
October	6,130	2,260	3,550	.368	.42	A.
November	26,500	2,530	7,850	.813	.91	A.
December	69,700	5,380	17,800	1.84	2.12	A.
The year	114,000	2,260	13,500	1.39	18.98	
1908.						
January	136,000	6,920	25,400	2.63	3.03	A.
February	129,000	6,920	24,100	2.50	2.70	A.
March	67,200	10,000	28,600	2.96	3.41	A.
April	16,800	5,750	10,200	1.06	1.18	A.
May	97,100	6,130	32,100	3.33	3.84	A.
June	15,200	4,010	7,250	.751	.84	A.
July	11,000	2,530	4,470	.463	.53	A.
August	8,180	2,530	3,880	.402	.46	A.
September	4,010	1,520	2,500	259	.29	A.
October	5,750	1,750	2,780	.288	.33	A.
November	4,670	2,000	2,670	.277	.31	A.
December	3,400	1,520	2,440	.253	.29	A.
The year	136,000	1,520	12,200	1.26	17.21	

NOTE.—The discharge of the Chesapeake and Ohio Canal is not included in the above values of discharge. The error of the annual run-off per square mile from this cause is less than 1 per cent.

SHENANDOAH RIVER AT MILLVILLE, W. VA.

This station is located at a ferry about one-fourth mile above the Baltimore and Ohio Railroad station at Millville, W. Va. It was established April 15, 1895, and was discontinued March 31, 1909. The station was also temporarily discontinued April 1 to June 30, 1907, during which period the discharge has been estimated from the discharge of the Potomac at Point of Rocks. It is located about 4½ miles above the junction of the Shenandoah with the Potomac at Harpers Ferry, W. Va.

No important tributaries enter the Shenandoah between the junction of the South and North forks of the Shenandoah at Riverton, Va., and Harpers Ferry, W. Va.

Records of discharge at this point are of importance for showing the distribution of the flow of the Potomac above Harpers Ferry when used in conjunction with the Point of Rocks records. They are of value for showing the regimen of flow of the Shenandoah River drainage and for power purposes.

Discharge measurements were made from a cable of 500 feet span. The tree which supported the cable on the left bank was blown down in a storm a short time after the station was discontinued. The datum of the vertical staff gage, which is located about 200 feet below the cable on the left bank, has remained constant since the establishment of the station.

Conditions of flow at this station are fairly permanent and a good rating curve has been developed for low and medium stages. It is uncertain at high stages owing to lack of discharge measurements. The banks overflow at high stages. Ice conditions affect the flow to a greater or lesser extent during the winter period.[a]

The following discharge measurement was made January 15, 1908: Width, 520 feet; area, 4,380 square feet; gage height, 6.93 feet; discharge, 18,400 second-feet.

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[a] Discharge data prior to 1907 have been revised and republished in Water-Supply Paper 192.

Daily gage height, in feet, of Shenandoah River at Millville, W. Va., for 1907–8.

[W. R. Nicewarner, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.8	2.25	2.2	.....	.....	.....	2.0	1.2	1.15	2.15	1.0	2.4
2	4.1	2.1	2.3	.....	.....	.....	2.0	1.2	1.0	2.0	1.0	2.2
3	3.6	2.25	2.3	.....	.....	.....	2.2	1.15	1.1	1.4	1.1	2.0
4	3.25	2.4	2.8	.....	.....	.....	2.0	1.15	1.1	1.3	1.1	1.9
5	3.0	2.4	2.7	.....	.....	.....	1.8	1.15	1.6	1.2	1.3	1.8
6	2.9	2.0	2.6	.....	.....	.....	1.7	1.1	2.3	1.6	1.4	1.75
7	2.7	1.85	2.5	.....	.....	.....	1.7	1.1	1.5	1.5	1.3	1.7
8	2.5	2.0	2.3	.....	.....	.....	1.6	1.0	1.2	1.5	1.25	1.65
9	2.5	2.0	2.3	.....	.....	.....	1.6	1.15	1.1	1.45	1.1	1.65
10	2.4	2.3	2.25	.....	.....	.....	1.55	1.1	1.0	1.4	1.05	1.8
11	2.4	2.3	2.8	.....	.....	.....	1.6	1.15	1.2	1.35	1.0	4.5
12	2.4	2.25	2.3	.....	.....	.....	1.6	2.2	1.6	1.3	1.0	4.2
13	2.4	2.6	3.1	.....	.....	.....	1.55	1.15	2.3	1.4	1.2	3.8
14	2.85	2.4	3.7	.....	.....	.....	1.5	1.25	2.0	1.3	1.2	3.4
15	3.1	2.7	4.0	.....	.....	.....	1.4	1.2	1.7	1.2	1.2	3.1
16	3.4	2.8	3.8	.....	.....	.....	1.4	1.1	1.5	1.2	1.2	2.95
17	3.4	2.8	3.5	.....	.....	.....	1.3	1.25	1.3	1.2	1.2	3.0
18	3.5	2.7	3.1	.....	.....	.....	1.5	1.1	1.1	1.2	1.2	2.9
19	3.5	2.6	3.0	.....	.....	.....	1.5	1.1	1.0	1.1	1.15	2.75
20	4.5	2.5	3.35	.....	.....	.....	1.5	1.1	1.2	1.1	1.15	2.6
21	5.3	2.5	3.0	.....	.....	.....	1.5	1.2	1.2	1.1	1.2	2.4
22	4.1	2.4	3.0	.....	.....	.....	2.0	1.3	1.4	1.05	1.3	2.3
23	3.55	2.25	2.9	.....	.....	.....	1.5	1.3	1.4	1.1	1.5	2.3
24	3.2	2.1	2.7	.....	.....	.....	1.45	1.25	3.4	1.05	2.0	5.9
25	3.0	2.1	2.5	.....	.....	.....	1.4	1.45	6.8	1.0	3.6	6.8
26	2.8	2.1	2.4	.....	.....	.....	1.35	2.0	3.9	1.0	4.6	5.5
27	2.7	2.1	2.3	.....	.....	.....	1.3	1.55	2.9	1.0	3.8	4.4
28	2.5	2.2	2.25	.....	.....	.....	1.3	1.4	2.5	1.0	3.2	3.5
29	2.4	.....	2.2	.....	.....	.....	1.3	1.3	2.3	1.0	2.9	3.2
30	2.4	.....	2.0	.....	.....	.....	1.3	1.2	2.2	1.0	2.6	3.0
31	2.3	.....	2.0	.....	.....	.....	1.25	1.2	.....	1.0	.....	2.85
1908.												
1	2.75	2.6	3.2	2.3	1.45	3.2	1.5	1.6	2.5	1.6	2.8	1.15
2	2.7	2.4	3.4	2.4	1.45	2.8	1.5	1.4	1.8	1.4	2.4	1.15
3	2.6	2.2	4.0	2.45	1.45	2.5	2.0	1.2	1.65	1.2	2.1	1.2
4	2.45	2.1	4.3	2.45	1.5	2.3	1.6	1.1	1.5	1.15	1.9	1.1
5	2.35	2.05	4.1	2.4	1.6	3.3	1.6	1.15	1.4	1.05	1.7	1.05
6	2.3	2.0	3.9	2.35	1.8	3.4	1.6	1.1	1.45	1.0	1.6	1.1
7	2.25	2.1	4.5	2.3	2.75	3.3	1.5	1.1	1.5	1.0	1.55	1.1
8	2.25	2.4	4.4	2.3	4.9	2.9	1.5	1.1	1.45	1.0	1.5	1.05
9	2.3	2.4	4.2	2.25	4.2	2.6	1.55	1.4	1.4	1.0	1.4	1.15
10	2.25	2.2	4.0	2.15	4.0	2.6	1.4	1.2	1.4	.9	1.3	1.1
11	2.2	2.1	3.7	2.0	3.4	2.55	1.4	1.1	1.35	1.0	1.35	1.0
12	3.2	2.2	3.5	2.0	2.9	2.5	1.3	1.2	1.25	1.2	1.2	1.15
13	12.0	2.5	3.3	1.95	2.7	2.35	1.3	1.2	1.15	1.1	1.15	1.1
14	9.7	2.95	3.2	1.9	2.4	2.2	1.25	1.2	1.1	1.15	1.1	1.1
15	6.6	6.5	3.0	1.85	2.3	2.1	1.2	1.1	1.05	1.0	1.2	1.1
16	5.4	10.0	2.85	1.85	2.15	2.4	1.1	1.0	1.0	.95	1.25	1.1
17	4.6	7.8	2.75	1.8	2.0	4.0	1.0	1.1	1.0	.9	1.2	1.1
18	4.0	5.7	2.7	1.8	2.0	2.8	1.0	1.6	.95	.85	1.2	1.05
19	3.8	4.5	2.7	1.75	3.2	2.4	1.0	1.3	.9	.8	1.2	1.0
20	3.5	4.0	2.8	1.8	3.3	2.2	1.0	1.2	1.0	.9	1.15	1.0
21	3.4	3.7	2.75	1.75	4.4	2.0	1.0	1.1	.95	.85	1.3	1.0
22	3.35	3.4	2.7	1.65	9.4	2.1	1.0	1.0	.9	.85	1.4	1.0
23	3.3	3.2	2.7	1.6	8.5	1.9	1.0	1.0	.85	.8	1.5	1.05
24	3.2	3.0	2.6	1.6	7.4	1.9	1.1	.95	.85	.85	1.3	1.0
25	3.1	2.9	2.5	1.6	5.7	1.8	1.3	1.0	.85	1.2	1.3	1.0
26	3.0	3.0	2.4	1.55	4.7	1.8	2.9	2.3	.9	3.6	1.25	1.0
27	2.95	3.7	2.35	1.55	4.85	1.75	2.6	4.4	.9	2.5	1.25	1.1
28	2.95	3.5	2.4	1.5	3.9	1.7	2.4	4.2	.9	2.2	1.2	1.2
29	2.9	3.3	2.3	1.5	3.4	1.6	2.7	4.0	2.0	2.2	1.2	1.2
30	2.7	.....	2.25	1.5	3.6	1.5	2.4	3.5	1.9	1.85	1.2	1.2
31	2.65	.....	2.3	.....	3.4	.....	2.0	3.2	.....	3.3	.....	1.3

Rating table for Shenandoah River at Millville, W. Va., for 1905–1908.

Gage height	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	780	2.20	2,750	3.60	5,830	6.00	14,240
.90	880	2.30	2,940	3.70	6,100	6.20	15,120
1.00	980	2.40	3,130	3.80	6,380	6.40	16,000
1.10	1,090	2.50	3,330	3.90	6,670	6.60	16,920
1.20	1,200	2.60	3,530	4.00	6,960	6.80	17,840
1.30	1,320	2.70	3,730	4.20	7,560	7.00	18,800
1.40	1,450	2.80	3,940	4.40	8,200	8.00	24,020
1.50	1,580	2.90	4,150	4.60	8,860	9.00	30,400
1.60	1,720	3.00	4,370	4.80	9,540	10.00	37,500
1.70	1,870	3.10	4,600	5.00	10,260	11.00	45,100
1.80	2,030	3.20	4,840	5.20	11,020	12.00	53,500
1.90	2,200	3.30	5,080	5.40	11,780		
2.00	2,380	3.40	5,320	5.60	12,580		
2.10	2,560	3.50	5,570	5.80	13,400		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 16 discharge measurements made during 1895 and 1904–1908. It is well defined between gage heights .4 feet and 5.2 feet.

Monthly discharge of Shenandoah River at Millville, W. Va., for 1907–8.

[Drainage area, 3,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	11,400	2,940	4,710	1.57	1.81	A.
February	3,940	2,120	2,990	.997	1.04	A.
March	6,960	2,380	3,840	1.28	1.46	A.
April[a]	.....	.....	4,600	1.53	1.71	D.
May[a]	.....	.....	3,400	1.13	1.30	D.
June[a]	.....	.....	7,200	2.40	2.68	D.
July	2,750	1,260	1,700	.567	.65	A.
August	2,750	980	1,300	.433	.50	A.
September	17,800	980	2,570	.857	.96	A.
October	2,660	980	1,300	.433	.50	A.
November	8,860	980	2,100	.700	.78	A.
December	17,800	1,800	4,880	1.63	1.88	A.
The year	.....	980	3,380	1.13	15.27	
1908.						
January	53,500	2,750	7,550	2.52	2.90	A.
February	37,500	2,380	6,640	2.21	2.38	A.
March	8,520	2,840	4,890	1.63	1.88	A.
April	3,230	1,580	2,290	.763	.85	A.
May	33,200	1,520	7,070	2.36	2.72	A.
June	6,960	1,580	3,240	1.08	1.20	A.
July	4,150	980	1,740	.580	.67	A.
August	8,200	930	2,120	.707	.82	A.
September	3,330	830	1,330	.443	.49	A.
October	5,830	780	1,530	.510	.59	A.
November	3,940	1,090	1,550	.517	.58	A.
December	1,320	980	1,080	.360	.42	A.
The year	53,500	780	3,420	1.14	15.50	

[a] Mean monthly discharge for April, May, and June, 1907, determined from discharge at Point of Rocks, using the same rate of discharge per square mile.

MONOCACY RIVER NEAR FREDERICK, MD.

This station is located at the county bridge on the toll road leading from Frederick to Mount Pleasant, Md. It is about 3½ miles northeast of Frederick. It was established August 4, 1896.

The station has been maintained to obtain general statistical and comparative data regarding the flow of Monocacy River. It is of prime importance in that the Monocacy is the principal stream between the Point of Rocks station and Great Falls. (See Potomac River at Point of Rocks, Md.)

The station is about 3,000 feet below Tuscarora Creek, which enters from the right, and about 2,000 feet above Israel Creek, which enters from the left.

The datum of the chain gage has been maintained the same since the establishment of the station. The discharge is liable to be affected by ice conditions more or less during the winter months. Conditions of flow at this station change somewhat from year to year, requiring changes in the rating curves.[a]

The observer at this station has been paid by the Maryland state weather service during 1907 and 1908.

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[a] Discharge data prior to 1907 have been revised and republished in Water-Supply Paper 192.

Daily gage height, in feet, of Monocacy River near Frederick, Md., for 1907–8.

[Eugene L. Derr, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	12.2	5.7	4.9	5.5	5.2	7.9	9.5	4.5	4.2	5.1	4.8	5.8
2	9.5	6.5	6.7	5.4	5.15	10.2	7.6	5.4	4.1	4.9	4.8	5.7
3	7.4	6.3	13.7	5.4	5.1	8.9	6.5	5.3	4.8	4.8	4.3	5.6
4	6.9	6.4	10.5	5.3	5.1	6.9	5.9	4.9	4.6	4.8	6.4	5.4
5	6.5	6.8	9.2	5.3	5.1	6.8	5.3	4.5	4.5	4.8	5.6	5.3
6	6.4	6.8	9.1	5.2	5.0	6.4	5.0	4.5	4.4	4.8	5.5	5.2
7	5.9	6.8	8.9	5.3	5.0	5.6	9.5	4.5	4.2	4.7	5.3	5.2
8	5.6	6.7	6.2	6.3	5.2	5.4	6.5	4.5	4.2	4.7	5.2	5.2
9	7.5	6.4	7.1	9.3	6.1	5.3	5.5	6.2	4.2	4.7	5.2	5.3
10	6.9	5.9	6.9	8.2	7.9	5.3	5.3	5.5	4.2	4.6	6.4	16.5
11	6.0	5.8	6.2	7.5	7.2	7.4	5.3	5.4	5.0	4.6	6.1	14.5
12	6.5	5.7	7.4	6.1	6.5	6.8	15.9	4.9	5.5	4.6	5.9	10.4
13	10.6	5.4	12.0	5.9	5.6	6.4	9.15	4.5	4.9	4.6	5.6	7.1
14	8.9	5.4	17.6	5.8	5.4	6.4	7.2	4.4	4.6	4.5	5.2	9.5
15	8.7	5.3	11.3	5.7	5.3	6.4	6.9	4.3	4.2	4.5	5.2	11.1
16	9.7	5.3	10.5	5.5	5.3	5.9	5.8	4.3	4.2	4.5	5.1	9.1
17	9.2	5.5	9.5	5.4	5.2	5.6	5.7	4.2	4.2	4.4	5.1	8.9
18	8.3	5.7	12.0	5.3	5.2	5.4	5.7	4.3	6.9	4.4	5.1	7.6
19	7.6	5.6	10.5	5.3	5.2	5.3	7.9	4.2	5.1	4.4	8.5	7.3
20	15.0	5.5	9.5	5.2	5.2	5.3	5.9	4.2	5.0	4.4	7.9	6.9
21	14.2	5.4	9.1	5.2	5.1	9.5	5.3	4.2	5.0	4.4	6.5	6.4
22	10.4	5.3	8.5	5.2	5.1	6.2	5.2	4.3	4.5	4.35	7.4	6.1
23	8.5	5.3	7.9	5.4	4.9	5.6	5.1	4.3	11.1	4.3	8.1	13.4
24	6.9	5.3	7.1	7.1	4.9	5.2	4.9	6.1	11.9	4.3	9.1	10.2
25	6.3	5.3	6.6	7.1	5.1	5.0	4.7	5.9	6.9	4.3	13.9	9.3
26	6.2	5.1	6.2	5.6	5.1	4.9	4.7	5.7	6.4	4.3	10.5	8.5
27	5.7	5.0	5.9	5.4	5.9	4.7	4.7	4.7	5.5	4.3	7.5	7.9
28	5.5	4.9	5.8	5.3	5.7	4.7	4.6	4.3	4.9	4.5	6.6	7.1
29	5.5	.....	5.8	5.2	5.4	7.5	4.6	4.3	5.6	6.5	6.4	7.1
30	5.5	.....	5.7	5.2	4.9	10.1	4.6	4.2	5.2	5.5	6.1	7.1
31	5.6	.....	5.6	.....	4.8	.....	4.5	4.2	.....	4.8	.....	7.5
1908.												
1	6.9	5.6	7.0	7.4	4.9	5.9	4.4	4.45	4.25	4.45	4.25	4.05
2	6.5	5.6	8.9	6.3	4.9	5.5	4.4	4.35	4.15	4.35	4.15	4.05
3	6.1	5.5	8.6	6.2	4.9	5.4	4.4	4.25	4.15	4.25	4.15	4.05
4	6.1	5.5	8.7	5.9	4.9	5.3	4.4	4.25	4.05	4.15	4.15	4.05
5	6.1	5.5	8.5	5.8	5.1	5.2	4.7	4.25	4.05	4.05	4.05	4.05
6	5.8	5.5	12.2	5.8	5.7	5.1	4.6	4.25	4.15	4.05	4.05	4.05
7	5.9	5.4	11.6	5.8	17.8	5.1	4.3	4.85	4.15	4.05	4.05	4.15
8	9.6	5.3	11.5	5.8	19.0	5.1	4.3	4.65	4.15	4.05	4.15	4.35
9	9.4	5.2	10.6	7.1	8.7	5.1	4.3	4.85	4.15	4.05	4.15	4.35
10	9.1	5.2	9.6	6.9	7.5	5.0	4.3	4.45	4.05	4.05	4.15	4.25
11	8.9	5.1	8.9	5.9	7.1	4.9	4.2	4.45	4.05	4.55	4.05	4.25
12	14.9	5.1	7.9	5.7	6.2	4.9	4.2	4.45	4.05	5.65	4.05	4.25
13	14.8	5.8	7.4	5.6	6.1	4.7	4.2	4.25	4.05	5.15	4.05	4.25
14	10.2	8.5	7.1	5.5	6.1	4.6	4.2	4.15	4.05	5.05	4.05	4.35
15	7.3	19.6	6.9	5.7	6.1	4.6	4.2	4.15	4.05	4.25	4.05	4.35
16	6.7	24.1	6.7	5.6	6.1	5.5	4.2	4.15	3.95	4.05	4.05	4.35
17	6.6	8.9	6.5	5.6	5.9	4.9	4.2	5.15	3.95	4.05	4.15	4.35
18	6.4	7.9	6.2	5.5	5.8	4.8	4.2	6.45	3.95	4.05	4.15	4.95
19	6.3	6.5	8.4	5.5	9.05	4.8	4.2	5.05	3.95	4.05	4.25	5.05
20	6.2	6.3	8.2	5.5	22.3	4.7	4.1	4.45	3.95	4.05	4.25	4.85
21	6.2	6.1	6.5	5.5	18.9	4.6	4.1	4.35	3.95	4.05	4.25	4.75
22	6.1	6.0	6.5	5.4	15.2	4.6	7.2	4.15	3.95	4.05	4.25	4.45
23	6.1	5.9	6.4	5.1	19.6	4.6	6.9	4.15	3.95	4.05	4.25	4.25
24	6.1	5.8	6.4	5.1	12.5	4.6	6.4	4.15	3.95	4.15	4.25	4.25
25	6.2	5.7	5.9	5.0	8.7	4.5	9.7	4.15	3.95	5.15	4.25	4.35
26	6.2	18.4	5.7	5.0	7.0	4.5	8.5	6.45	3.95	5.15	4.25	4.35
27	6.2	23.5	5.6	5.0	6.6	4.4	5.5	5.85	3.95	4.85	4.25	4.45
28	5.9	12.5	5.5	5.0	6.3	4.4	5.3	5.05	3.95	4.65	4.25	4.45
29	5.8	7.1	6.1	4.9	6.2	4.4	4.9	4.85	6.45	4.45	4.15	4.35
30	5.7	.....	6.4	4.9	6.1	4.4	4.7	4.35	5.85	4.35	4.15	4.25
31	5.6	.....	7.9	.....	6.0	.....	4.6	4.35	.....	4.25	.....	4.15

NOTE.—Ice conditions prevailed from about February 7 to 11, 1907.

Rating table for Monocacy River near Frederick, Md., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.90	90	5.40	632	6.90	1,625	9.80	4,300
4.00	113	5.50	682	7.00	1,705	10.00	4,500
4.10	138	5.60	734	7.20	1,875	11.00	5,500
4.20	165	5.70	789	7.40	2,045	12.00	6,500
4.30	194	5.80	846	7.60	2,220	13.00	7,550
4.40	225	5.90	906	7.80	2,400	14.00	8,600
4.50	258	6.00	969	8.00	2,580	15.00	9,650
4.60	293	6.10	1,034	8.20	2,765	16.00	10,700
4.70	330	6.20	1,102	8.40	2,955	17.00	11,750
4.80	368	6.30	1,172	8.60	3,145	18.00	12,800
4.90	408	6.40	1,242	8.80	3,335	19.00	13,850
5.00	450	6.50	1,315	9.00	3,525	20.00	14,900
5.10	493	6.60	1,390	9.20	3,715		
5.20	538	6.70	1,465	9.40	3,905		
5.30	584	6.80	1,545	9.60	4,100		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1900–1906, and is fairly well defined between gage heights 3.9 feet and 10 feet. Above gage height 12 feet the rating curve is a tangent, the difference being 105 per tenth.

Monthly discharge of Monocacy River near Frederick, Md., for 1907–8.

[Drainage area, 660 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	9,650	682	2,680	4.06	4.68	A.
February	1,540	408	814	1.23	1.28	A.
March	12,400	408	3,240	4.91	5.66	A.
April	3,810	538	967	1.47	1.64	A.
May	2,490	368	686	1.04	1.20	A.
June	4,700	330	1,430	2.17	2.42	A.
July	10,600	258	1,430	2.17	2.50	A.
August	1,100	165	375	.568	.65	A.
September	6,400	138	831	1.26	1.41	A.
October	1,320	194	330	.500	.58	A.
November	8,500	194	1,540	2.33	2.60	A.
December	11,200	538	2,810	4.26	4.91	A.
The year	12,400	138	1,430	2.16	29.53	
1908.						
January	9,540	734	2,130	3.23	3.72	A.
February	19,200	493	3,400	5.15	5.55	A.
March	6,710	682	2,470	3.74	4.31	A.
April	2,040	408	811	1.23	1.37	A.
May	17,300	408	3,870	5.86	6.76	A.
June	906	225	408	.618	.69	A.
July	4,200	138	592	.897	1.03	A.
August	1,280	152	335	.508	.59	A.
September	1,280	102	186	.282	.31	A.
October	762	126	235	.356	.41	A.
November	180	126	154	.233	.26	B.
December	472	126	212	.321	.37	A.
The year	19,200	102	1,240	1.87	25.37	

NOTE.—Discharge during the frozen period, February 7 to 11, 1907, estimated, 958 second-feet.

RAPPAHANNOCK RIVER DRAINAGE BASIN.

RAPPAHANNOCK RIVER NEAR FREDERICKSBURG, VA.

Rappahannock River rises on the eastern slope of the Blue Ridge, in Rappahannock and Fauquier counties, Va., and takes a general southeasterly course to Chesapeake Bay, into which it discharges at a point about 36 miles from Cape Charles. The length of its course in a straight line is about 132 miles, and its drainage area measures approximately 2,700 square miles.[a] It crosses the fall line, with considerable fall, at the city of Fredericksburg; below that point it is a sluggish, tidal, navigable stream, spreading out in places to a width of several miles. There are no lakes in the basin, and the flow of the river is exceedingly variable. The bed is generally of rock, overlain with gravel and sand, and the banks are in most places high enough to confine the stream except at high freshets. The slope of the stream is not uniform, but is broken by falls at several places. At Fredericksburg the elevation of the river above tide is zero; 35½ miles above it is 252 feet, showing a fall of 7.1 per mile. The average annual rainfall in this basin is about 42 inches. The principal tributary is the Rapidan, which enters from the right 10 or 12 miles above Fredericksburg, and drains about 745 square miles. No important tributary enters between the mouth of the Rapidan and Fredericksburg.

The gaging station, which was established September 19, 1907, in cooperation with the Fredericksburg Power Company, by whom the cable and equipment were furnished, is located about 3½ miles above the city. The records of discharge are important in determining the amount of power available between the station and Fredericksburg. (See Pl. VI.) The station is located at a pool a few hundred feet above a rocky control, and is about 1½ miles above the dam of the power company. The discharge is probably not affected by backwater, as there is considerable fall between the station and the dam.

The original staff gage was destroyed February 14, 1908, and was replaced on February 20 by a chain gage under the cable. The datum, which is the same for both gages, has been maintained at a constant elevation.

The discharge is likely to be affected by ice during the winter period. Conditions of flow at the station are probably permanent. At extreme low water the current is very sluggish, and accurate discharge measurements are difficult. A good low-water rating curve has been developed.

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[a] Reports on the water powers of the United States: Tenth Census, vol. 16, p. 553. 1885.

Discharge measurements of Rappahannock River near Fredericksburg, Va., 1907–8.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
December 7	C. C. Covert	452	2,020	1.78	1,110
December 9	do	452	2,010	1.76	1,060
1908.					
February 20	A. H. Horton	455	2,950	3.98	5,060
April 29	Follansbee and Barrows	455	1,910	1.57	813
July 16	R. H. Bolster	450	1,770	1.19	437

Daily gage height, in feet, of Rappahannock River near Fredericksburg, Va., for 1907–8.

[J. W. Franklin, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1907.					1907.					1907.				
1	.....	1.98	1.25	2.10	11	.....	1.48	2.28	5.30	21	1.22	1.25	2.22	2.40
2	.....	1.82	1.25	2.10	12	.....	1.48	1.95	4.00	22	1.22	1.28	2.20	2.30
3	.....	1.70	3.28	2.00	13	.....	1.45	1.75	3.10	23	2.22	1.25	2.25	3.98
4	.....	1.68	2.50	1.90	14	.....	1.40	1.68	3.25	24	8.85	1.25	5.50	5.75
5	.....	1.65	1.78	1.90	15	.....	1.40	1.60	4.72	25	3.30	1.25	5.35	3.80
6	.....	1.65	1.65	1.75	16	.....	1.35	1.55	3.62	26	2.65	1.22	3.52	3.20
7	.....	1.52	1.82	1.75	17	.....	1.35	1.55	3.15	27	2.28	1.20	2.95	3.00
8	.....	1.55	2.05	1.75	18	.....	1.35	1.58	2.92	28	2.10	1.30	2.62	3.00
9	.....	1.60	1.72	1.75	19	1.22	1.35	2.35	2.80	29	2.45	1.58	2.42	2.68
10	.....	1.52	1.78	2.98	20	1.20	1.30	2.38	2.55	30	2.38	1.42	2.30	2.80
										31	.....	1.30	.....	3.18

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	3.05	2.1	3.2	2.7	1.35	3.35	2.1	2.15	1.8	2.22	2.55	1.5
2	2.48	2.2	3.3	2.55	1.25	2.85	2.3	1.85	1.72	2.15	2.25	1.55
3	2.38	2.1	3.05	2.5	1.65	2.35	2.5	1.72	1.6	2.0	2.1	1.4
4	2.32	2.1	2.9	2.25	1.55	2.8	2.45	1.6	1.55	1.9	2.2	1.5
5	2.30	2.6	2.7	2.18	1.55	3.95	2.45	1.5	1.5	1.8	2.1	1.5
6	2.25	3.0	4.2	2.2	1.65	2.65	2.35	1.4	7.1	1.62	1.9	1.44
7	2.6	2.3	4.3	2.1	2.55	2.35	2.25	1.3	3.2	1.7	1.9	1.82
8	6.6	2.95	3.6	2.1	3.38	2.25	2.1	1.3	2.3	1.6	1.8	1.68
9	3.88	2.7	3.1	2.05	3.35	2.15	1.62	1.45	2.0	1.52	1.7	1.5
10	2.65	2.6	3.15	2.2	2.15	1.95	1.45	1.42	1.9	1.65	1.75	1.55
11	3.85	2.6	3.3	2.22	2.1	2.3	1.35	1.5	1.7	1.78	1.7	1.6
12	8.5	2.88	2.85	2.0	2.05	2.25	1.3	1.35	1.7	2.6	1.68	3.05
13	8.8	3.38	2.8	2.12	1.95	2.05	1.25	1.3	1.52	2.05	1.85	2.72
14	4.82	.....	2.62	1.9	1.88	1.95	1.15	1.3	1.42	1.85	1.8	2.0
15	3.9	.....	2.4	1.95	1.78	1.85	1.1	1.2	1.45	1.8	1.75	1.78
16	3.52	.....	2.48	1.9	1.75	3.85	1.05	1.18	1.3	1.65	2.0	1.78
17	3.25	.....	2.4	1.75	1.7	3.45	1.0	1.1	1.35	1.6	2.1	1.75
18	3.0	.....	2.5	1.85	1.65	2.75	.9	2.8	1.3	1.6	1.9	1.6
19	2.8	.....	2.5	1.95	1.65	2.75	1.1	2.3	1.3	1.55	1.9	1.7
20	2.7	3.95	2.4	2.0	3.8	2.55	1.1	1.6	1.25	1.6	1.85	1.65
21	2.0	3.75	2.2	1.9	4.75	2.3	1.0	1.35	1.3	1.55	1.7	1.5
22	2.55	3.05	2.2	1.8	8.3	2.05	.9	1.25	1.45	1.5	1.75	1.55
23	2.5	3.0	2.35	1.8	4.85	1.95	1.6	1.3	1.5	1.42	1.7	1.55
24	2.4	2.82	2.45	1.6	3.45	2.15	2.2	1.35	1.5	1.4	1.55	1.4
25	2.4	2.6	2.42	1.6	3.2	1.8	2.1	1.25	1.45	3.7	1.6	1.75
26	2.15	3.9	2.3	1.6	3.0	1.75	2.75	8.3	1.4	2.75	1.55	1.85
27	2.52	5.9	2.12	1.48	2.8	1.7	3.05	5.3	1.35	2.55	1.5	1.8
28	2.62	4.0	2.15	1.4	2.55	1.6	3.05	4.4	1.4	2.25	1.6	1.95
29	2.22	3.45	2.2	1.3	2.45	1.5	2.55	2.3	5.0	2.38	1.52	2.15
30	2.2	.....	2.25	1.3	2.4	1.35	2.2	2.1	2.85	4.2	1.45	2.22
31	2.2	.....	2.35	.....	2.95	.....	2.1	2.0	.....	2.85	.....	3.28

POWER DEVELOPMENT ON RAPPAHANNOCK RIVER NEAR FREDERICKSBURG, VA.

Rating table for Rappahannock River near Fredericksburg, Va., for 1907–8.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec. feet.*	*Feet.*	*Sec. feet.*	*Feet.*	*Sec. feet.*	*Feet.*	*Sec. feet.*
0.90	285	2.20	1,660	3.50	4,000	5.60	9,500
1.00	340	2.30	1,810	3.60	4,210	5.80	10,120
1.10	400	2.40	1,965	3.70	4,425	6.00	10,750
1.20	470	2.50	2,125	3.80	4,645	6.20	11,390
1.30	550	2.60	2,290	3.90	4,870	6.40	12,050
1.40	645	2.70	2,460	4.00	5,100	6.60	12,720
1.50	750	2.80	2,635	4.20	5,580	6.80	13,400
1.60	865	2.90	2,815	4.40	6,090	7.00	14,100
1.70	985	3.00	3,000	4.60	6,620	8.00	17,800
1.80	1,110	3.10	3,190	4.80	7,170	9.00	21,850
1.90	1,240	3.20	3,385	5.00	7,730		
2.00	1,375	3.30	3,585	5.20	8,310		
2.10	1,515	3.40	3,790	5.40	8,900		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 5 discharge measurements made during 1907–8 and 1 made in 1909. It is well defined between gage heights 1.2 feet and 4 feet.

Monthly discharge of Rappahannock River near Fredericksburg, Va., for 1907–8.

[Drainage area, 1,590 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
September 19 to 30	21,200	470	3,170	1.99	0.89	B.
October	1,350	470	711	.447	.52	A.
November	9,200	510	2,060	1.30	1.45	A.
December	9,960	1,050	3,160	1.99	2.29	A.
1908.						
January	21,000	1,380	4,150	2.61	3.01	A.
February	20,000	1,520	4,780	3.01	3.25	B.
March	5,830	1,540	2,590	1.63	1.88	A.
April	2,460	550	1,330	.836	.93	A.
May	19,000	510	2,780	1.75	2.02	A.
June	4,980	598	1,990	1.25	1.40	A.
July	3,100	285	1,270	.799	.92	A.
August	19,000	400	1,900	1.19	1.37	A.
September	14,400	510	1,650	1.04	1.16	A.
October	5,580	645	1,510	.950	1.10	A.
November	2,210	698	1,160	.730	.81	A.
December	3,540	645	1,170	.736	.85	A.
The year	21,000	285	2,190	1.38	18.70	

NOTE.—The discharge February 14 to 19, 1908, was estimated 10,700 second-feet on the basis of a comparison of discharge of Potomac, James, and Rappahannock rivers.

SUMMARIES OF DISCHARGE PER SQUARE MILE.

The following tables of summaries of discharge per square mile are given to allow of ready comparison of relative rates of run-off from different areas in the North Atlantic coast drainages.

They show in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage. But the most important fact worth noting is the almost entire lack of uniformity or agreement between any two stations. It indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, of north Atlantic coast drainages for 1907–8.

Gaging station.	Drainage area (square miles).	1907. Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	1908. Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
New England States.																											
St. John, Fort Kent, Me	5,280	0.19	0.14	0.14	1.27	7.54	2.95	2.25	1.09	0.61	1.42	2.75	1.17	1.79	0.53	0.27	0.48	1.47	7.80	3.05	0.58	0.51	0.17	0.20	0.16	0.23	1.29
Fish, Wallagrass, Me	890	.34	.25	.25	.99	6.89	3.42	2.16	2.33	.92	1.49	2.79	1.21	1.92	.67	.38	.46	2.01	7.97	2.80	.75	.54	.34	.17	.14	.17	1.37
Aroostook, Fort Fairfield, Me	2,230	.36	.22	.31	2.08	7.76	2.76	2.40	2.32	1.03	1.41	2.71	1.83	2.10	.67	.60	.77	3.07	7.98	2.75	.36	.38	.16	.19	.24	.22	1.45
St. Croix, Woodland, Me	1,420	1.23	.68	.96	2.20	3.30	2.98	2.42	2.32	2.20	1.74	1.78	2.06	1.99	1.90	1.27	1.55	2.37	3.68	2.46	1.06	1.27	1.06	.88	.70	.63	1.57
Machias, Whitneyville, Me	465	1.63	.86	1.18	4.80	4.71	3.46	1.19	.63	.61	1.52	3.01	2.90	2.21	2.56	2.97	3.57	3.76	4.06	3.33	.84	.86	.53	.90	.96	.80	2.10
Penobscot (West Branch), Millinockett, Me	1,880	1.08	.80	.20	.77	3.76	3.69	2.77	1.85	1.14	1.44	3.83	2.40	1.98	1.66	1.52	1.59	1.56	5.43	3.68	2.02	1.32	1.06	1.06	1.06	1.06	1.92
Penobscot, West Enfield, Me	6,600	1.03	.60	.44	2.67	6.10	3.02	2.67	1.64	1.15	1.53	3.39	2.55	2.23	1.71	1.58	1.70	3.42	5.97	2.70	1.20	.91	.64	.52	.61	.60	1.80
Penobscot (East Branch), Grindstone, Me	1,100	.73	.32	.27	1.79	7.27	4.55	3.26	1.36	.72	.62	3.14	2.70	2.23	.84	.62	.94	2.46	6.30	2.69	2.13	.76	.46	.34	.40	.16	1.51
Mattawamkeag, Mattawamkeag, Me	1,500	.89	.49	.46	4.46	6.05	2.65	2.84	1.57	1.00	1.68	2.45	2.94	2.29	1.99	1.67	1.52	4.52	6.11	2.33	.30	.30	.13	.29	.61	.48	1.69
Piscataquis, Foxcroft, Me	286	1.75	.87	1.05	8.39	9.27	2.16	3.19	1.56	2.09	4.16	6.57	4.16	3.77	2.87	2.78	3.08	7.66	8.29	1.43	.24	.60	.33	.32	.24	.52	2.36
Phillips Lake outlets, Dedham and Holden, Me	12.3	1.98	3.28	3.41	5.01	5.25	3.19	2.75	1.67	1.80	1.61	3.08	3.97	3.08	4.31	4.15	4.35	5.59	5.38	4.13	....	....	....	....	....	....	....
Moose, Rockwood, Me	680	.44	.22	.34	1.51	7.15	2.90	2.32	1.51	.69	1.96	4.96	2.21	2.18	1.18	.59	.82	2.97	7.04	3.28	.50	.32	.26	.28	.20	.15	1.47
Kennebec, The Forks, Me	1,570	.59	.80	1.03	1.00	5.38	3.23	2.50	2.34	1.24	.76	3.79	1.73	2.03	1.56	1.29	1.97	1.93	6.69	4.37	1.89	1.80	.99	.58	.37	.29	1.98
Kennebec, Bingham, Me	2,660	....	....	....	....	....	....	2.24	1.71	1.18	1.38	3.66	2.13	....	1.20	.98	1.43	2.45	5.86	3.09	1.33	1.05	.73	.42	.28	.28	1.59
Kennebec, North Anson, Me	2,790	.52	.55	.88	2.31	6.24	2.77	2.58	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kennebec, Waterville, Me	4,270	.68	.68	.96	3.93	4.61	3.79	2.09	1.25	1.10	1.81	4.47	3.26	2.39	.91	.91	1.20	2.09	2.07	1.77	.96	.93	.50	.40	.30	.29	1.03
Roach, Roach River, Me	85	.59	.35	.59	1.10	11.5	6.85	1.61	2.92	2.84	2.76	4.21	1.67	3.08	1.11	1.27	1.44	1.79	8.53	3.11	....	....	....	....	....	....	....
Dead, The Forks, Me	870	.44	.23	.66	2.80	8.48	2.66	1.94	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Carrabassett, North Anson, Me	340	.74	.44	1.18	6.85	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sandy, Madison, Me	650	.56	.22	.71	6.28	4.26	1.29	.97	.29	.61	2.11	3.62	1.77	1.89	1.11	1.29	2.45	4.54	3.62	1.54	.14	.45	.13	.11	.19	.19	1.31
Cobbosseecontee, Gardiner, Me	240	1.04	1.06	1.09	3.32	1.40	.98	.99	1.01	.92	.97	1.22	.93	1.24	1.70	1.94	1.76	1.77	2.60	1.61	.96	.94	.95	.71	.54	.48	1.33
Androscoggin, Shelburne, N. H	1,500	.67	.60	.87	2.22	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Androscoggin, Rumford Falls, Me	2,090	.74	.66	.93	2.72	4.61	1.79	1.42	.98	1.18	2.14	3.62	1.80	1.88	1.25	1.33	1.76	3.31	4.32	2.02	.83	.76	.66	.75	.72	.54	1.52
Androscoggin, Dixfield, Me	2,230	.84	.75	1.05	3.52	5.70	2.01	1.52	1.02	1.24	2.44	4.35	2.15	2.22	1.42	1.51	2.03	4.17	5.29	2.40	....	....	....	....	....	....	....
Presumpscot, Outlet of Sebago, Me	420	1.20	1.12	.70	.83	1.14	1.25	1.21	1.00	.80	1.16	1.41	1.45	1.11	1.61	1.82	1.32	1.25	1.33	1.52	1.34	1.62	1.71	1.66	1.57	1.40	1.51
Saco, Center Conway, N. H	385	.88	.42	2.08	5.25	6.83	1.95	1.16	.63	1.44	3.35	6.47	3.01	2.79	1.36	2.01	2.29	5.95	6.05	1.71	.94	1.45	.45	.48	.55	.43	1.97
Saco, West Buxton, Me	1,550	....	....	....	....	....	....	....	....	....	....	4.50	2.75	....	2.02	1.83	2.35	4.39	4.90	1.84	.74	.79	.46	.45	.41	.43	1.72
Pemigewasset, Plymouth, N. H	615	.85	.41	2.28	5.61	5.79	1.79	1.11	.48	1.42	4.03	5.09	3.43	2.69	1.42	2.47	2.60	6.80	6.47	1.24	.90	1.53	.28	.34	.55	.44	2.09
Merrimac, Franklin Junction, N. H	1,460	1.25	.92	1.68	3.96	3.71	1.69	1.12	.77	1.18	2.86	3.73	2.34	2.10	1.36	2.01	2.51	4.03	4.39	1.50	1.00	1.49	.66	.62	.74	.65	1.75
Merrimac, Garvins Falls, N. H	2,340	1.33	.88	1.87	3.88	2.94	1.50	.98	.64	.94	2.34	3.74	2.47	1.96	1.69	1.77	2.81	3.94	4.03	1.32	.79	1.00	.52	.50	.56	.53	1.62
Merrimac, Lawrence, Mass	4,450	1.41	.67	1.73	2.92	2.03	1.19	.75	.43	.66	1.43	2.91	2.18	1.53	1.95	1.65	2.50	2.65	2.57	.93	.52	.67	.38	.33	.35	.42	1.24
Contoocook, West Hopkinton, N. H	410	1.61	.95	2.20	4.10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Nashua (South Branch), Clinton, Mass	118.2	2.26	1.07	2.63	2.22	1.49	1.20	.52	.14	1.25	2.14	3.93	3.04	1.82	2.69	2.68	3.39	1.96	2.19	.62	.34	.68	.14	.24	.19	.60	1.31
Sudbury, Framingham, Mass.[a]	75.2	2.09	.96	2.56	2.49	1.37	1.18	.01	(b)	.84	1.15	3.09	3.14	1.56	2.98	2.38	3.49	1.73	1.62	.30	(c)	.16	(d)	.07	.11	.21	1.07
Lake Cochituate, Cochituate, Mass.[a]	18.9	1.64	.90	2.06	1.96	1.24	.90	.11	.25	.95	.99	2.36	2.49	1.32	2.05	2.41	2.95	1.53	1.33	.32	.24	.18	(e)	.11	.12	.39	.96
Connecticut, Sunderland, Mass	7,700	1.23	.61	2.16	4.29	3.90	1.49	1.19	.65	.90	2.77	3.69	2.79	2.14	1.75	1.97	3.21	4.23	4.18	1.34	.49	.61	.26	.26	.29	.48	1.59

Ashuelot, Hinsdale, N. H.	440	....	....	....	3.00	1.68	1.35	.78	.42	.88	2.24	3.52	2.66	....	1.91	1.87	3.09	2.95	2.61	.73	.39	.50	.25	.20	.20	.30	1.25
Quaboag, West Warren, Mass.	144	2.33	.95	2.15	2.86	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Westfield Little, Blandford, Mass.	43	3.28	1.21	3.95	2.72	2.09	2.16	.32	.13	1.88	5.63	5.16	4.44	2.75	3.84	3.28	6.79	3.12	4.19	.64	.44	.33	.13	.23	.27	.83	2.01
Housatonic, Gaylordsville, Conn.	1,020	2.04	1.10	2.38	2.29	1.97	2.12	.90	.48	1.19	3.63	4.85	3.06	2.17	2.76	2.80	3.12	2.74	2.46	.94	.67	.58	.30	.31	.28	.40	1.45
Hudson River.																											
Hudson, North Creek, N. Y.	804	....	....	....	....	....	....	....	....	....	2.64	3.15	2.45	....	1.62	2.51	3.40	6.55	6.50	1.02	1.03	.92	.65	.66	.78	.71	2.21
Hudson, Thurman, N. Y.	1,550	....	....	....	....	....	....	....	....	.98	1.92	2.92	2.31	....	1.69	2.34	3.06	5.50	5.10	1.10	.91	.61	.47	.50	.59	.58	1.87
Hudson, Fort Edward, N. Y.	2,800	2.72	1.22	2.43	4.82	4.00	1.51	.96	.62	1.26	2.61	3.68	3.23	2.42	1.67	1.47	1.52	5.43	4.57	1.05	.67	.28	.34	.55	.66	.69	1.57
Hudson, Mechanicville, N. Y.	4,500	2.29	.92	2.13	3.69	3.09	1.24	.92	.53	1.37	2.12	3.11	2.67	2.01	1.87	2.15	3.11	4.96	3.98	.84	.48	.39	.23	.31	.41	.45	1.60
Schroon, Riverbank, N. Y.	534	....	....	....	....	....	....	....	....	.34	1.02	2.87	2.12	....	1.89	2.12	2.43	5.92	5.22	1.31	.63	.22	.30	.30	.36	.37	1.76
Sacandaga, Wells, N. Y.	263	....	....	....	....	....	....	....	....	.70	1.97	4.26	3.04	....	1.71	3.28	3.79	11.90	7.79	1.13	.28	.12	.07	.27	.46	1.01	2.65
Sacandaga, Northville, N. Y.	740	....	....	....	....	....	....	....	....	.74	2.70	4.62	4.12	....	1.93	3.59	3.89	13.00	8.16	1.16	.34	.20	.09	.28	.53	.60	2.81
Sacandaga, Hadley, N. Y.	1,050	....	....	....	....	....	....	....	....	....	2.15	3.96	2.90	....	1.81	3.26	3.31	9.71	7.09	1.24	.36	.22	.13	.35	.50	.61	2.38
Fish Creek, Burgoyne, N. Y.	236	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.37	.33	.53	....	....
Hoosic, Buskirk, N. Y.	579	2.28	.52	2.31	2.44	1.87	1.31	1.51	.48	.94	2.95	3.26	2.68	1.88	1.78	1.93	3.45	3.39	2.90	.92	.65	.71	.31	.32	.34	.22	1.41
Mohawk, Little Falls, N. Y.	1,310	....	....	....	....	....	1.06	.93	.57	1.28	2.31	2.84	3.24	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mohawk, Dunsbach Ferry, N. Y.	3,440	3.61	.67	3.20	2.99	1.93	.90	.69	.30	.92	2.08	2.62	2.86	1.90	1.41	2.51	4.04	4.30	3.05	.65	.51	.42	.15	.55	.88	.85	1.61
West Canada Creek, Twin Rock Bridge, N. Y.	364	5.47	1.15	....	5.96	3.85	1.40	1.26	.74	2.35	4.15	3.54	10.5	....	2.71	....	5.71	9.67	7.45	1.71	....	.59	.55	.60	1.33	1.04	....
West Canada Creek, East Bridge, N. Y.	574	....	....	....	4.77	3.12	1.31	1.07	.73	2.02	....	....	4.27	....	....	....	4.72	8.48	5.14	1.32	1.24	.68	.47	.64	1.31	1.33	....
East Canada Creek, Dolgeville, N. Y.	256	4.26	1.34	2.29	2.06	.96	1.05	.62	.54	.92	2.38	2.59	3.19	1.85	1.57	2.83	4.38	8.09	4.73	1.22	1.03	.67	.48	.54	1.20	1.16	2.33
Schoharie, Prattsville, N. Y.	240	2.02	.67	2.70	2.52	2.12	1.47	.48	.09	1.06	3.24	5.56	5.16	2.26	1.79	3.18	4.13	3.00	3.99	.60	.31	.14	.07	.54	.42	.81	1.58
Kinderhook, Rossman, N. Y.	331	2.42	.53	2.10	2.21	1.72	1.51	.68	.18	1.10	3.44	3.81	2.82	1.88	2.18	2.07	3.14	2.53	2.22	.96	.64	.35	.14	.17	.22	.18	1.23
Esopus Creek, Olive Bridge, N. Y.	239	3.11	.85	2.65	2.27	2.48	1.74	.38	.13	1.77	3.54	6.02	4.67	2.47	2.68	3.36	4.77	4.02	6.56	1.01	.57	.23	.15	.74	.80	.85	2.21
Esopus Creek, Kingston, N. Y.	324	3.45	.85	2.75	2.38	2.49	1.70	.41	.14	2.02	3.77	6.32	4.91	2.60	2.70	3.35	4.48	3.42	5.71	1.04	.59	.20	.11	.61	.59	.59	1.95
Rondout Creek, Rosendale, N. Y.	380	3.98	2.25	5.64	2.08	1.97	1.34	.41	.17	1.48	2.55	5.06	3.45	2.53	3.03	3.73	5.24	3.41	4.64	.91	.36	.21	.12	.37	.37	.51	1.91
Middle Atlantic States.																											
Passaic, Chatham, N. J.	101	5.71	.50	6.93	1.77	2.72	.64	.29	.17	1.34	2.08	4.54	3.28	2.50	3.00	2.94	3.56	.89	3.64	.92	.52	.52	.34	.57	.33	1.32	1.55
Raritan, Bound Brook, N. J.	800	2.80	.62	3.92	1.45	1.70	.87	.67	.48	2.08	2.12	3.82	3.28	1.98	2.90	4.04	2.46	1.07	3.40	.93	.64	.79	.46	.88	1.01	1.48	1.67
Delaware (West Branch), Hancock, N. Y.	680	2.71	.44	3.51	2.15	1.76	.66	.39	.13	.76	2.12	3.24	4.59	1.87	1.81	2.32	5.69	3.88	3.46	.37	.26	.12	.08	.25	.41	.37	1.58
Delaware (East Branch), Hancock, N. Y.	920	3.05	.49	3.88	2.59	2.17	1.27	.54	.20	.53	2.36	4.37	4.70	2.18	1.99	2.58	5.09	4.39	3.68	.59	.39	.18	.14	.58	.71	.38	1.73
Delaware, Port Jervis, N. Y.	3,250	3.05	.77	3.32	1.98	1.57	1.00	.47	.18	.56	1.60	3.20	3.75	1.79	2.04	2.44	4.86	3.32	3.26	.61	.35	.16	.10	.40	.58	.46	1.55
Delaware, Riegelsville, N. J.	6,430	2.78	.87	3.36	1.79	1.43	1.08	.61	.32	.81	1.68	3.44	3.97	1.84	2.30	2.94	4.70	2.86	3.50	.98	.55	.33	.24	.51	.64	.52	1.67
Paulins Kill, Columbia, N. J.	179	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.55	.53	.90	.52	.54	....
Tohickon Creek, Point Pleasant, Pa.	102	3.71	1.34	7.28	1.26	.92	.97	.35	.08	3.76	2.77	4.35	4.25	2.59	2.40	4.64	3.13	.65	2.94	.32	.17	.09	.06	.32	.14	.49	1.28
Neshaminy Creek, below forks, Pa.	139	3.46	1.48	5.27	1.40	1.54	1.19	.39	.25	2.23	2.21	3.83	3.50	2.23	2.09	4.32	2.73	.96	2.53	.67	.48	1.40	.30	.84	.46	1.22	1.50
Schuylkill, Philadelphia, Pa.	1,920	2.29	.92	2.35	1.05	.85	.62	.61	.55	1.95	1.84	2.55	3.50	1.59	1.93	3.59	3.05	1.43	2.36	.55	.66	.31	.21	.32	.24	.43	1.26
Perkiomen Creek, Frederick, Pa.	152	2.99	.82	4.12	1.18	.82	.93	.56	.41	3.63	1.74	3.88	3.62	2.06	2.45	4.39	2.85	1.18	2.52	.54	.95	.34	.16	.38	.28	.54	1.38

[a] Attention is called to the fact that the Sudbury River records do not give the actual run-off of the river (which would include the effect of storage in the wet season and draft from storage in the dry season from the tributary reservoirs and streams as well as the loss by evaporation from them), but the natural flow of the basin *without* storage, as nearly as this flow can be measured and adjusted for the change in volume of stored water, without, however, taking into account the actual loss of water by evaporation from the water surfaces of the existing reservoirs and streams in this drainage basin. It may be said that this method of figuring the yield is common for waterworks or public supplies, and is used also in the Nashua and Croton records, but for streams utilized chiefly for production of power the effect of storage as well as the loss by evaporation is included in the yield or run-off measurements and records.

[b] −0.16. [c] −0.02. [d] −0.13. [e] −0.03.

Summary of discharge, in second-feet per square mile, of north Atlantic coast drainages for 1907–8—Continued.

Gaging station.	Drainage area (square miles).	1907.													1908.												
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Susquehanna, Binghamton, N. Y.	2,400	3.64	.77	3.27	2.59	1.89	.57	.60	.22	.91	2.18	2.95	4.38	2.00	1.66	2.85	5.62	3.53	3.13	.60	.34	.16	.10	.21	.38	.21	1.57
Susquehanna, Wysox, Pa.	7,930	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.08	.12	.20	.20	....
Susquehanna, Wilkesbarre, Pa.	9,810	3.01	.54	2.46	1.82	1.40	.49	.44	.15	.52	1.13	1.90	3.10	1.41	1.44	2.20	4.61	2.55	2.63	.46	.28	.15	.09	.13	.19	.14	1.24
Susquehanna, Danville, Pa.	11,100	2.96	.53	2.37	1.81	1.42	.62	.57	.21	.63	1.14	1.98	3.18	1.45	1.50	2.33	4.63	2.50	2.81	.52	.33	.18	.09	.12	.18	.14	1.28
Susquehanna, Harrisburg, Pa.	24,000	3.18	.75	3.42	1.62	1.41	1.00	.65	.25	.64	.79	1.55	2.71	1.50	1.90	2.31	5.33	2.47	3.52	.81	.46	.28	.15	.20	.23	.27	1.49
Susquehanna, McCall Ferry, Pa.	26,800	3.13	.81	3.49	1.59	1.31	1.04	.86	.36	.74	.85	1.65	2.78	1.55	2.11	2.61	5.15	2.47	3.46	.89	.58	.36	.17	.23	.23	.26	1.54
Chenango, Binghamton, N. Y.	1,530	3.34	.55	2.86	2.27	1.81	.66	.60	.22	.95	2.01	2.50	3.84	1.80	1.39	2.41	4.99	3.14	2.61	.48	.27	.18	.10	.12	.26	.16	1.34
Chemung, Chemung, N. Y.	2,440	2.05	.40	1.74	1.55	.96	.45	.37	.07	.09	.35	.95	1.91	.91	.98	1.47	4.22	1.57	2.47	.44	.31	.14	.05	.08	.08	.06	.99
Susquehanna (West Branch), Williamsport, Pa.	5,640	3.56	.88	4.33	1.66	1.57	1.42	.93	.18	.31	.58	1.26	2.13	1.57	2.00	2.50	6.70	2.64	4.40	1.01	.36	.24	.10	.16	.16	.26	1.71
Juniata, Newport, Pa.	3,480	4.02	.84	5.12	1.53	1.37	1.61	.57	.32	.74	.41	.99	2.17	1.64	2.25	2.45	6.52	1.83	4.28	.88	.51	.30	.24	.29	.26	.39	1.68
Broad Creek, Mill Green, Md.	16.4	1.85	1.22	3.46	1.29	1.13	1.23	1.12	1.24	1.37	1.04	2.20	3.55	1.72	2.82	4.02	2.53	1.48	1.65	.99	1.93	1.01	.66	.78	.81	.88	1.63
Deer Creek, Churchville, Md.	141	1.70	1.28	2.79	1.45	1.30	1.42	1.01	1.11	1.93	1.18	2.64	2.98	1.73	2.72	5.08	2.69	1.77	2.55	1.03	1.94	1.34	.78	1.36	.84	1.01	1.93
Gunpowder Falls, Glencoe, Md.	160	1.91	1.54	3.50	1.65	1.39	1.51	2.09	1.16	1.79	1.30	2.19	3.14	1.93	2.95	4.44	3.05	1.86	2.21	1.01	2.03	1.54	1.09	1.51	1.23	1.16	2.01
Little Gunpowder Falls, Belair, Md.	43	2.35	1.40	3.53	1.96	1.59	1.80	1.22	1.11	1.79	1.23	2.42	3.51	1.99	3.12	4.86	2.63	1.77	1.82	1.07	1.02	1.13	.75	1.12	.99	1.15	1.79
Patapsco, Woodstock, Md.	251	2.23	1.20	3.23	1.61	1.23	1.67	1.38	1.32	1.53	.91	1.13	1.48	1.58	1.67	4.62	2.38	1.78	2.10	1.54	1.94	.93	.62	.66	.57	.62	1.64
Potomac, Point of Rocks, Md.	9,650	2.80	.99	3.16	1.54	1.15	2.40	.62	.38	.67	.37	.81	1.84	1.39	2.63	2.50	2.96	1.06	3.33	.75	.46	.40	.26	.29	.28	.25	1.26
Shenandoah, Millville, W. Va.	3,000	1.57	1.00	1.28	1.53	1.13	2.40	.57	.43	.86	.43	.70	1.63	1.13	2.52	2.21	1.63	.76	2.36	1.08	.58	.71	.44	.51	.52	.36	1.14
Monocacy, Frederick, Md.	660	4.06	1.23	4.91	1.47	1.04	2.17	2.17	.57	1.26	.50	2.33	4.26	2.16	3.23	5.15	3.74	1.23	5.86	.62	.90	.51	.28	.36	.23	.32	1.87
Rappahannock, Fredericksburg, Va.	1,590	....	....	....	....	....	....	....	....	....	.45	1.30	1.99	....	2.61	3.01	1.63	.84	1.75	1.25	.80	1.19	1.04	.95	.73	.74	1.38

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DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 242

SURFACE WATER SUPPLY OF THE UNITED STATES

1907-8

PART II. SOUTH ATLANTIC COAST AND EASTERN GULF OF MEXICO

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

M. R. HALL AND R. H. BOLSTER

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SURFACE WATER SUPPLY OF THE SOUTH ATLANTIC COAST AND EASTERN GULF OF MEXICO, 1907–8.

By M. R. Hall and R. H. Bolster.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of flow measurements made on certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with organizations mentioned herein. These investigations are authorized by the organic law of the Geological Survey (Stat. L., vol. 20, p. 394), which provides, among other things, as follows:

> Provided that this officer [the director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

Inasmuch as water is the most abundant and most valuable mineral in nature, the investigation of water resources is included under the above provision for investigating mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the river systems or parts thereof that might purposefully be studied. The scope of the work is limited to that which can be provided with the appropriations available. The field covered and the character of the work are believed to be the best that could be accomplished under the controlling conditions. It would undoubtedly be of more scientific importance and ultimately of more practical value if the money now applied to wide areas were concentrated on a few small basins. Such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be maintained during a period of years sufficient to cover all stages, in order that within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum may be determined. The length of such a period manifestly varies for different streams and can not be absolutely determined. Experience has shown that the records should cover from five to ten years, or for some streams twenty years or more, the limit being determined by the relative importance of the stream and the interdependence of the results and other long-time records on adjacent streams.

In the performance of this work the Geological Survey endeavors to approach as nearly as possible the highest degree of precision which a rational expenditure of time and a judicious expenditure of a small amount of money will allow. In all engineering work there is a point of refinement beyond which it is needless and wasteful to proceed, and this principle applies with especial force to stream-flow measurements. It is confidently believed that with some unavoidable exceptions the stream-flow data presented in the publications of the Survey are sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of many stations. All persons are cautioned to exercise the greatest care in the utilization of such incomplete records.

Records of varying lengths have been obtained at about 1,400 different points in the United States, and in addition the surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, has been investigated. During 1907 and 1908 regular gaging stations were maintained by the Survey and cooperating organizations at about 740 points in the United States, and in addition numerous miscellaneous measurements were made. Data were also obtained in regard to precipitation, evaporation, storage reser-

voirs, river profiles, and water power in many sections of the country. These data will be made available in the regular surface water-supply papers and in special papers from time to time.

PURPOSES OF THE WORK.

Among the purposes for which the results contained in this volume are requisite are navigation, irrigation, domestic water supply, water power, swamp and overflow land drainage, and flood prevention. The demands of all these interests are immediate.

Navigation.—The Federal Government has expended more than $250,000,000 for the improvement of inland navigation and prospective expenditures will approximate several times this amount. It is obvious that the determination of stream flow is necessary to the intelligent solution of the many problems involved.

Irrigation.—The United States is now expending $42,000,000 on federal irrigation systems, and this amount is far exceeded by the private expenditures of this nature in the arid West. The integrity of any irrigation system is based absolutely on the amount of water available. Therefore investigations of stream flow in that portion of the country are of first importance in the redemption of the lands, as well as constituting an insurance of federal and private investments.

Domestic water supply.—The highest use of water is that of domestic supply, and while the federal interest in this aspect of the matter is less direct than in the aspects already named this use of water nevertheless has so broad a significance with respect to the general welfare that the Federal Government is ultimately and intimately concerned.

Water power.—The time is rapidly approaching when the development of the water power of the country will be an economic necessity. Our stock of coal is being rapidly depleted and the cost of steam power is increasing accordingly. Industry will cease its growth if cheap power is not available, and in that event the United States as a nation will cease to progress. Water power is the only avenue now open. When the electric transmission of power was accomplished, the relation of our water powers to national economy changed entirely. Previous to the day of electric transmission the importance of a water power was largely confined to the locality at which it was generated, but it has now become a public utility in which the individual citizen is vitally interested. Inasmuch as the amount of water power that may be made available is dependent on the flow of rivers, the investigation of flow becomes a prerequisite in the judicious management of this source of energy.

Drainage of swamp and overflowed lands.—More than 70,000,000 acres of the richest land in this country are now practically worthless, or of precarious value, by reason of overflow and swamp con-

ditions. When this land is drained it becomes exceedingly productive and its value increases many fold. Such reclamation would add to the national assets at least $700,000,000. The study of run-off is the first consideration in connection with drainage projects. If, by the drainage of a large area into any particular channel that channel becomes so gorged with water which it had not hitherto been called upon to convey that overflow conditions are created in places where previously the land was not subject to inundation, then drainage results merely in an exchange of land values. This is not the purpose of drainage improvement.

Flood prevention.—The damage from floods in the United States exceeds $100,000,000 annually and in the year 1908 the aggregate damage, based on reliable data, approximated $250,000,000. Such an annual tax on the property of great regions should be reduced in the orderly progress of government. It goes without saying that any consideration of flood prevention must be based on a thorough knowledge of stream flow, both in the contributing areas which furnish the water and along the great lowland rivers.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey since its inception have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications has varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1907 and 1908. The dividing line between the North Atlantic and South Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1907–8.

Part.	No.	Title.	Part.	No.	Title.
I	241	North Atlantic coast.	VI	246	Missouri River basin.
II	242	South Atlantic coast and eastern Gulf of Mexico.	VII	247	Lower Mississippi River basin.
III	243	Ohio River basin.	VIII	248	Western Gulf of Mexico.
IV	244	St. Lawrence River basin.	IX	249	Colorado River basin.
V	245	Upper Mississippi River and Hudson Bay basins.	X	250	Great Basin.
			XI	251	California.
			XII	252	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey exclusive of all special papers. Numbers of reports are inclusive and dates also are inclusive so far as the data are available.

Stream-flow data in reports of the United States Geological Survey.

[Ann.=Annual Report; B.=Bulletin; W. S.=Water-Supply Paper.]

Report.	Character of data.	Year.
10th Ann., pt. 2	Descriptive information only	
11th Ann., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th Ann., pt. 2	do	1884 to June 30, 1891.
13th Ann., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th Ann., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th Ann., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W. S. 11	Gage heights (also gage heights for earlier years)	1896.
18th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896.
W. S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Republican.	1897.
W. S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W. S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W. S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th Ann., pt. 4	Monthly discharge (also for many earlier years)	1898.
W. S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st Ann., pt. 4	Monthly discharge	1899.
W. S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d Ann., pt. 4	Monthly discharge	1900.
W. S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W. S. 75	Monthly discharge	1901.
W. S. 82 to 85	Complete data	1902.
W. S. 97 to 100	do	1903.
W. S. 124 to 135	do	1904.
W. S. 165 to 178	do	1905.
W. S. 201 to 214	Complete data, except descriptions	1906.
W. S. 241 to 252	Complete data	1907-8.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119. The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1908. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1908.

	1899.[a]	1900.[b]	1901.	1902.	1903.	1904.	1905.	1906.	1907–8.
Atlantic coast and eastern Gulf of Mexico:									
New England rivers	35	47	65, 75	82	97	124	165	201	241
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	82	97	125	166	202	241
Susquehanna River to York River, inclusive	35	48	65, 75	82	97	126	167	203	241
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82),83	(97),98	126	167	203	242
Santee River to Pearl River, inclusive	36	48	65, 75	83	98	127	168	204	242
St. Lawrence River	36	49	65, 75	(82),83	97	129	170	206	244
Hudson Bay	.....	.....	66, 75	85	100	130	171	207	245
Mississippi River:									
Ohio River	36	48,(49)	65, 75	83	98	128	169	205	243
Upper Mississippi River	36	49	65, 75	83	98, (99)	128, (130)	171	207	245
Missouri River	(36), 37	49,(50)	66, 75	84	99	130, (131)	172	208	246
Lower Mississippi River	37	50	(65), 66, 75	(83),84	(98), 99	(128), 131	(169), 173	(205), 209	247
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248
Pacific coast and Great Basin:									
Colorado River	(37), 38	50	66, 75	85	100	133, (134)	175, (177)	211, (213)	249, (251)
Great Basin	38, (39)	51	66, 75	85	100	133, (134)	176, (177)	212, (213)	250, (251)
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100	134	177	213	251
North Pacific coast	38	51	66, 75	85	100	135	(177), 178	214	252

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	All stations in Colorado and Great Basin drainages lying in California repeated.
	Great Basin	

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined on the

basis of drainage area, local changes in name and lake surface being disregarded. After all stations from the source to the mouth of the main stem of the river have been given, the tributaries are taken up in regular order from source to mouth. The tributaries are treated the same as the main stream, all stations in each tributary basin being given before taking up the next one below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is often clearer to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Gallons per minute" is generally used in connection with pumping and city water supply.

The "miner's inch" is the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It is commonly used by miners and irrigators throughout the West and is defined by statute in each State in which it is used.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of March 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equal 18.7 United States gallons per second.
100 California miner's inches equal 96.0 Colorado miner's inches.
100 California miner's inches for one day equal 4.96 acre-feet.
100 Colorado miner's inches equal 2.60 second-feet.
100 Colorado miner's inches equal 19.5 United States gallons per second.
100 Colorado miner's inches equal 104 California miner's inches.
100 Colorado miner's inches for one day equal 5.17 acre-feet.
100 United States gallons per minute equal 0.223 second-feet.
100 United States gallons per minute for one day equal 0.442 acre-foot.
1,000,000 United States gallons per day equal 1.55 second-feet.
1,000,000 United States gallons equal 3.07 acre-feet.
1,000,000 cubic feet equal 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on one square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.

$1\frac{1}{3}$ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$=net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF TABLES.

For each drainage basin there is given a brief description of general conditions covering such features as area, source, tributaries, topography, geology, conditions of forestation, rainfall, ice conditions, irrigation, storage, power possibilities, and other special features of importance or interest.

For each regular current-meter gaging station are given in general, and so far as available, the following data: Description of station, list of discharge measurements, table of daily gage heights, rating table, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height and rating tables are omitted and a table of daily discharge is substituted. For stations where the flow is computed by shifting-channel methods, a table of daily discharge is given in place of rating tables, which are not used in these methods of computation.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting conditions of flow, and backwater; also full information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights gives the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights during ice conditions, backwater from obstructions, etc., are published as recorded, with suitable footnotes. The rating is not applicable for such periods unless the proper correction to the gage heights is known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which the rating tables and monthly-discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is published to enable engineers to determine the daily discharge by its application to the table of gage heights or to check results in the table of monthly discharge.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the period when the water surface was at crest height and the corresponding discharge consequently larger than given in this column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 13, are based.

FIELD METHODS OF MEASURING STREAM FLOW.

There are three distinct methods of determining the flow of open-channel streams: (1) By measurements of slope and cross section and the use of Chezy's and Kutter's formulas; (2) by means of a weir or dam; (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen depends on the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

Slope method.—Much information has been collected relative to the coefficients to be used in the Chezy formula, $v = c\sqrt{Rs}$. This has been utilized by Kutter, both in developing his formula for c and in determining the values of the coefficient n which appears therein. The results obtained by the slope method are in general only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value for n to be used in Kutter's formula. The most common use of this method is in estimating the flood discharge of a stream when the only data available are the cross section, the slope as shown by marks along the bank, and a knowledge of the general conditions. It is seldom used by the United States Geological Survey. For full information regarding this method the reader is referred to the various text-books on hydraulics.

Weir method.—Relatively few stations are maintained at weirs or dams by the United States Geological Survey. Standard types of

sharp-crested and broad-crested weirs within the limits for which accurate coefficients have been experimentally obtained give very accurate records of discharge if properly maintained. At practically all broad-crested weirs, however, there is a diversion of water either through or around the dam, usually for the purpose of development of water power. The flow is often complicated and the records are subject to errors from such sources as leakage through the dam, backwater at high stages, uncertainty regarding coefficient, crest which is not level, obstructions from logs or ice, use of flashboards, old turbines with imperfect ratings, and many others depending on the type of development and the uses of the diverted water.

In general, records of discharge at dams are usually accurate enough for practical use if no others are available. It has been the general experience of the United States Geological Survey, however, that records at current-meter gaging stations under unobstructed channel conditions are more accurate than those collected at dams, and where the conditions are reasonably favorable are practically as good as those obtained at sharp-crested weirs.

The determination of discharge over the different types of weirs and dams is treated fully in "Weir experiments, coefficients, and formulas" (Water-Supply Paper 200[a]) and in the various text-books on hydraulics. "Turbine water-wheel tests and power tables" (Water-Supply Paper 180) treats of the discharge through turbines when used as meters. The editions of both of these water-supply papers are practically exhausted. They can, however, be consulted at most of the larger libraries of the country or they can be obtained from the Superintendent of Documents, Washington, D. C., at a cost of 20 cents for No. 180 and 35 cents for No. 200. Remittances must be made by postal money order, express order, or New York draft.

Velocity method.—Streams in general present throughout their courses to a greater or less extent all conditions of permanent, semi-permanent, and varying conditions of flow. In accordance with the location of the measuring section with respect to these physical conditions, current-meter gaging stations may in general be divided into four classes—(1) those with permanent conditions of flow; (2) those with beds which change only during extreme high water; (3) those with beds which change frequently but which do not cause a variation of more than about 5 per cent of the discharge curves from year to year; and (4) those with constantly shifting beds. In determining the daily flow different office methods are necessary for each class. The field data on which the determinations are based and the methods of collecting them are, however, in general the same.

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[a] Water-Supply Paper 200 is a revision of No. 150, the edition of which is exhausted.

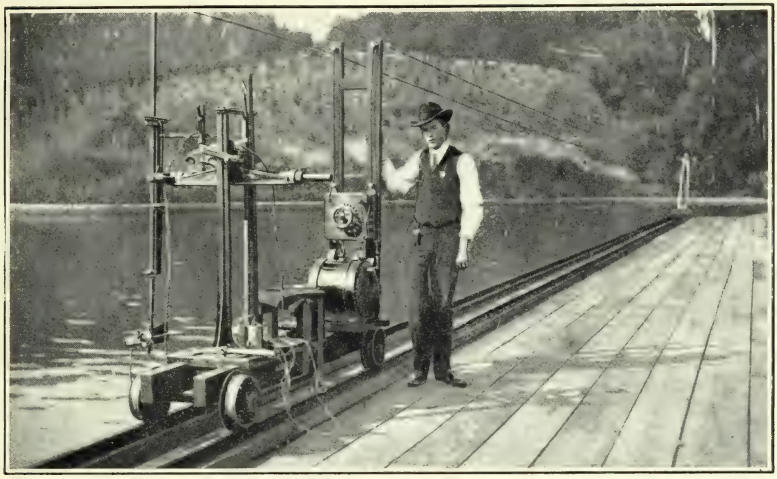
Great care is taken in the selection and equipment of gaging stations for determining discharge by velocity measurements, in order that the data may have the required degree of accuracy. They are located, as far as possible, at such points that the relation between gage height and discharge will always remain constant for any given stage. The experience of engineers of the Geological Survey has been that permanency of conditions of flow is the prime requisite of any current-meter gaging station when maintained for several years unless funds are available to cover all changes in conditions of flow. A straight, smooth section without cross currents, backwater, boils, etc., at any stage is highly desirable, but on most streams is not attainable except at the cost of a cable equipment. Rough, permanent sections, if measurements are properly made by experienced engineers, taking measuring points at a distance apart of 2 to 5 per cent or less of the total width, will within reasonable limits yield better results for a given outlay of money than semipermanent or shifting sections with smooth, uniform current. So far as possible, stations are located where the banks are high and not subject to overflow at high stages and out of the influence of tributary streams, dams, or other artificial obstructions which might affect the relation between gage height and discharge.

A gaging station consists essentially of a gage for determining the daily fluctuations of stage of the river and some structure or apparatus from which discharge measurements are made, usually a bridge or cable.

The two factors required to determine the discharge of a stream past a section perpendicular to the mean direction of the current are the area of the cross section and the mean velocity of flow normal to that section.

In making a measurement with a current meter a number of points, called measuring points, are measured off above and in the plane of the measuring section at which observations of depth and velocity are taken. (See Pl. I, *B*.) These points are spaced equally for those parts of the section where the flow is uniform and smooth and are spaced unequally for other parts according to the discretion and judgment of the engineer. In general the points should not be spaced farther apart than 5 per cent of the distance between piers, nor farther apart than the approximate mean depth at the time of measurement.

The measuring points divide the total cross section into elementary strips at each end of which observations of depth and velocity are made. The discharge of any elementary strip is the product of the average of the depths at the two ends times the width of the strip times the average of the mean velocities at the two ends of the



A. CURRENT-METER STATION AT LOS ANGELES, CAL.

B. BRIDGE STATION AND CROSS SECTION OF STREAM.

Illustrating 0.2 and 0.8 depth method.

strip. The sum of the discharges of the elementary strips is the total discharge of the stream. (For a discussion of methods of computing the discharge of a stream see Engineering News, June 25, 1908.)

Depths for the determination of the area are usually obtained by sounding with the current meter and cable. In rough sections or swift current an ordinary weight and cable are used, particular care being taken that all observations shall be in the plane of the cross section.

Two methods of determining the velocity of flow of a stream are in general use—the float method and the current-meter method.

The float method with its various modifications of surface, subsurface, and tube or rod floats is now considered obsolete in the ordinary practice of the United States Geological Survey. The use of this method is limited to special conditions where it is impracticable to use the current meter, such as in places where large quantities of ice or débris which may damage the meter are flowing with the current, and for miscellaneous measurements or other work where a high degree of accuracy is not necessary. Tube floats are very satisfactory for use in canals with regular bottoms and even flow of current. Measurements by the float method are made as follows: The velocity of flow of the stream is obtained by observing the time which it takes floats set free at different points across the stream to pass between two range lines about 200 feet apart. The area used is the mean value obtained from several cross sections measured between the two range lines. The chief disadvantages of this method are difficulty in obtaining the correct value of mean area for the course used and uncertainty regarding the proper coefficient to apply to the observed velocity. For further information regarding this method the reader is referred to Water-Supply Paper 95 and to the various text-books covering the general subject of stream flow.

The Price current meter is now used almost to the exclusion of other types of meters by the United States Geological Survey in the determination of the velocity of flow of water in open channels, a use for which it is adapted under practically all conditions. Plate II shows in the center the new type of penta-recording current meter equipped for measurements at bridge and cable stations. On the sides the same type of meter is shown equipped for wading measurements to record by the acoustic method on the left and by the electric method on the right. Briefly, the meter consists of six cups attached to a vertical shaft which revolves on a conical hardened steel point when immersed in moving water. The number of revolutions is indicated electrically. The rating, or relation between the velocity of the moving water and the revolutions of the wheel, is determined for each meter by drawing it through still water for a given distance

at different speeds and noting the number of revolutions for each run. (See Pl. I, A.) From these data a rating table is prepared which gives the velocity per second of moving water for any number of revolutions in a given time interval. The ratio of revolutions per second to velocity of flow in feet per second is very nearly a constant for all speeds and is approximately 0.45.

Three classes of methods of measuring velocity with current meters are in general use—multiple-point, single-point, and integration.

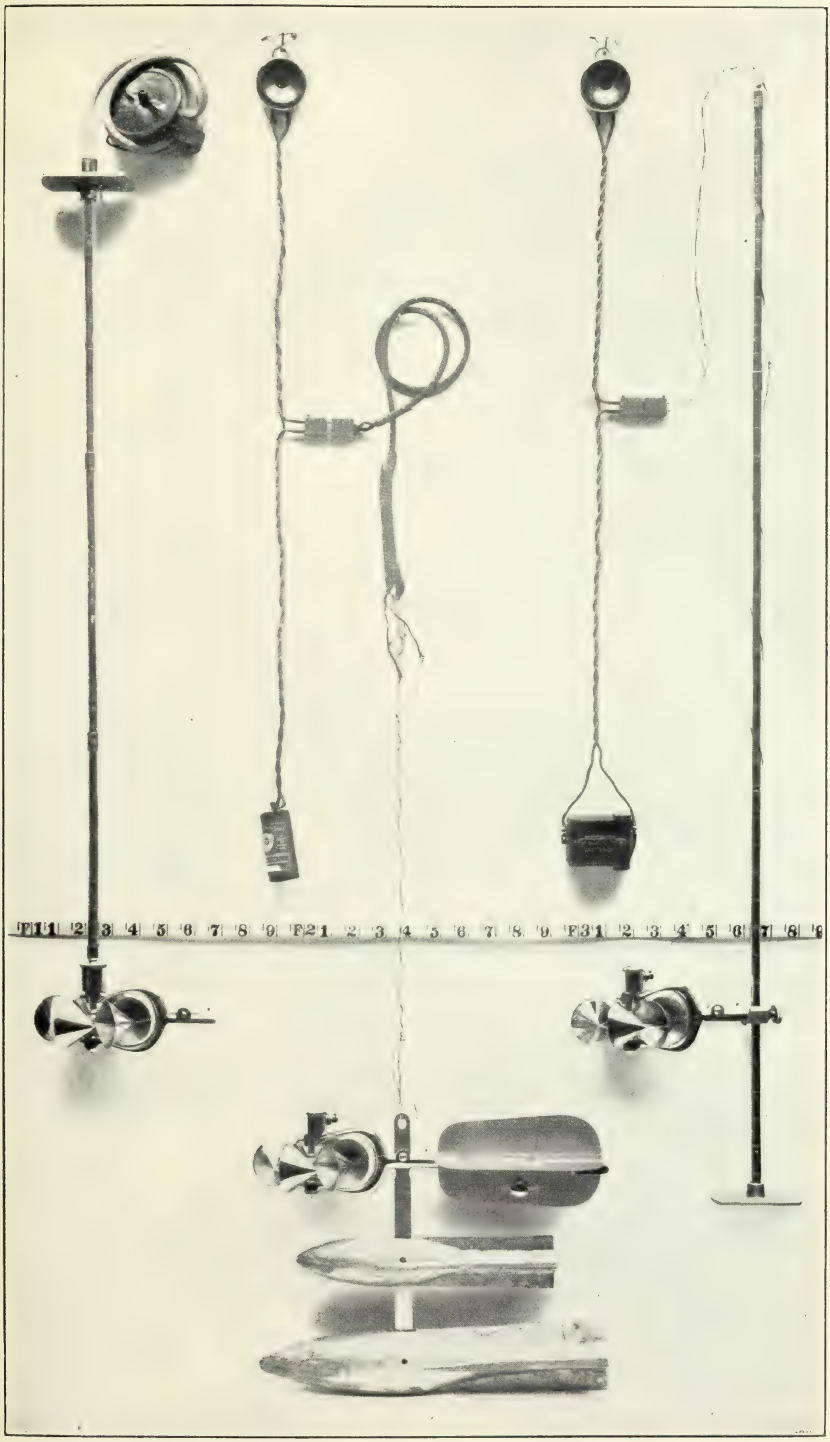
The two principal multiple-point methods in general use are the vertical velocity curve and 0.2 and 0.8 depth.

In the vertical velocity curve method a series of velocity determinations are made in each vertical at regular intervals, usually about 10 to 20 per cent of the depth apart. By plotting these velocities as abscissas and their depths as ordinates and drawing a smooth curve among the resulting points, the vertical velocity curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the area bounded by this velocity curve and its axis by the depth. This method of obtaining the mean velocity in the vertical is probably the best known, but on account of the length of time required to make a complete measurement its use is largely limited to the determination of coefficients for purposes of comparison and to measurements under ice.

In the second multiple-point method the meter is held successively at 0.2 and 0.8 depth, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. (See Pl. I.) On the assumption that the vertical velocity curve is a common parabola with horizontal axis, the mean of the velocities at 0.22 and 0.79 depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this multiple-point method gives the mean velocity very closely for open-water conditions and that in a completed measurement it seldom varies as much as 1 per cent from the value given by the vertical velocity curve method. Moreover, the indications are that it holds nearly as well for ice-covered rivers. It is very extensively used in the regular practice of the United States Geological Survey.

The single-point method consists in holding the meter either at the depth of the thread of mean velocity or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined or must be assumed.

Extensive experiments by means of vertical velocity curves show that the thread of mean velocity generally occurs between 0.5 and 0.7 total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and at this point the meter is held in most of the measurements made by the single-point method. A



PRICE PENTA-RECORDING CURRENT METERS.

large number of vertical velocity curve measurements, taken on many streams and under varying conditions, show that the average coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity. The variation of the coefficient from unity in individual cases is, however, greater than in the 0.2 and 0.8 method and the general results are not as satisfactory.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocity taken at the subsurface to the mean has been found to be in general from about 0.85 to 0.95, depending on the stage, velocity, and channel conditions. The higher the stage the larger the coefficient. This method is especially adapted for flood measurements, or when the velocity is so great that the meter can not be kept in the correct position for the other methods.

The vertical integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is useful as a check on the point methods. In using the Price meter great care should be taken that the vertical movement of the meter is not rapid enough to vitiate the accuracy of the resulting velocity.

The determination of the flow of an ice-covered stream is difficult, owing to diversity and instability of conditions during the winter period and also to lack of definite information in regard to the laws of flow of water under ice. The method now employed is to make frequent discharge measurements during the frozen periods by the 0.2 and 0.8 and the vertical velocity curve methods, and to keep an accurate record of the conditions, such as the gage height to the surface of the water as it rises in a hole cut in the ice, and the thickness and character of the ice. From these data an approximate estimate of the daily flow can be made by constructing a rating curve (really a series of curves) similar to that used for open channels, but considering, in addition to gage heights and discharge, the varying thickness of ice. For information in regard to flow under ice cover, see Water-Supply Paper 187.

OFFICE METHODS OF COMPUTING AND STUDYING DISCHARGE AND RUN-OFF.

At the end of each year the field or base data for current-meter gaging stations, consisting of daily gage heights, discharge measurements, and full notes, are assembled. The measurements are plotted on cross-section paper and rating curves are drawn wherever feasible.

The rating tables prepared from these curves are then applied to the tables of daily gage heights to obtain the daily discharges, and from these applications the tables of monthly discharge and run-off are computed.

Rating curves are drawn and studied with special reference to the class of channel conditions which they represent. (See p. 17.) The discharge measurements for all classes of stations when plotted with gage heights in feet as ordinates and discharges in second-feet as abscissas define rating curves which are more or less generally parabolic in form. In many cases curves of area in square feet and mean velocity in feet per second are also constructed to the same scale of ordinates as the discharge curve. These are used mainly to extend the discharge curves beyond the limits of the plotted discharge measurements, and for checking purposes to avoid errors in the form of the discharge curve and to determine and eliminate erroneous measurements.

For every published rating table the following assumptions are made for the period of application of the table: (*a*) That the discharge is a function of and increases gradually with the stage; (*b*) that the discharge is the same whenever the stream is at a given stage, and hence such changes in conditions of flow as may have occurred during the period of application are either compensating or negligible, except that the rating as stated in the footnote of each table is not applicable for known conditions of ice, log jams, or other similar obstructions; (*c*) that the increased and decreased discharge due to change of slope on rising and falling stages is either negligible or compensating.

As already stated, the gaging stations may be divided into several classes, as indicated in the following paragraphs:

The stations of class 1 represent the most favorable conditions for an accurate rating and are also the most economical to maintain. The bed of the stream is usually composed of rock and is not subject to the deposit of sediment and loose material. This class includes also many stations located in a pool below which is a permanent rocky riffle that controls the flow like a weir. Provided the control is sufficiently high and close to the gage to prevent cut and fill at the gaging point from materially affecting the slope of the water surface, the gage height will for all practical purposes be a true index of the discharge. Discharge measurements made at such stations usually plot within 2 or 3 per cent of the mean-discharge curve and the rating developed from that curve represents a very high degree of accuracy. For illustrative example of a station of this type see Water-Supply Paper 241.

Class 2 is confined mainly to stations on rough mountainous streams with steep slopes. The beds of such streams are as a rule compara-

tively permanent during low and medium stages and when the flow is sufficiently well defined by an adequate number of discharge measurements before and after each flood the stations of this class give nearly as good results as those of class 1. As it is seldom possible to make measurements covering the time of change at flood stage, the assumption is often made that the curves before and after the flood converged to a common point at the highest gage height recorded during the flood. Hence the only uncertain period occurs during the few days of highest gage heights covering the period of actual change in conditions of flow.

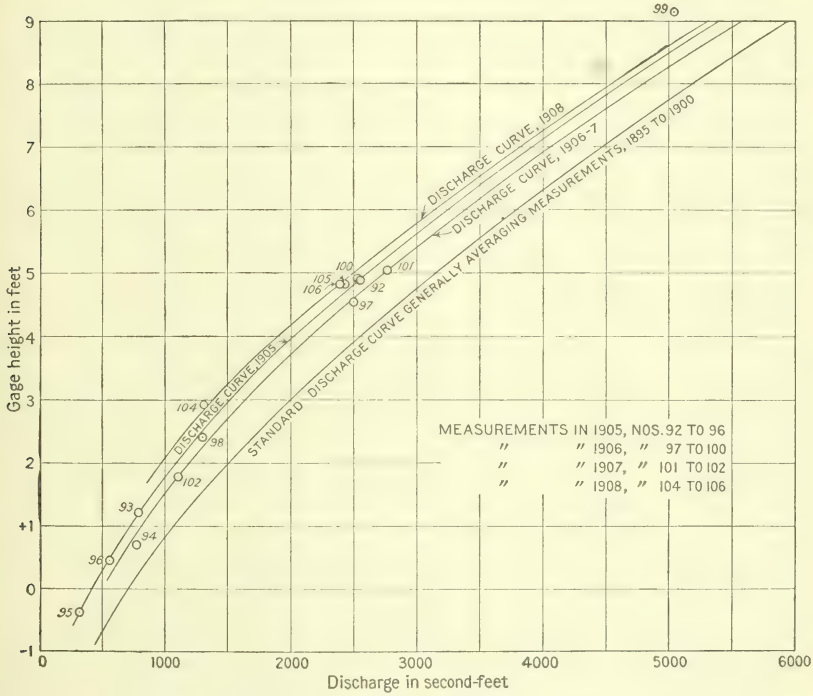


FIGURE 1.—Low and medium stage discharge curves for Ocmulgee River at Macon, Ga.

Class 3 includes most of the current-meter gaging stations maintained by the United States Geological Survey. (See fig. 1.) If sufficient measurements could be made at stations of this class results would be obtained nearly equaling those of class 1, but owing to the limited funds at the disposal of the Survey this is manifestly impossible, nor is it necessary for the uses to which discharge data are applied. The critical points are as a rule at relatively high or low stages. The percentage error, however, is greater at low stages. No absolute rule can be laid down for stations of this class. Each rating curve must be constructed mainly on the basis of the measurements

of the current year, the engineer being guided largely by the past history of the station and the following general law: If all measurements ever made at a station of this class are plotted on cross-section paper, they will define a mean curve which may be called a standard curve. It has been found in practice that if after a change caused by high stage, a relatively constant condition of flow occurs at medium and low stages, all measurements made after the change will plot on a smooth curve which is practically parallel to the standard curve with respect to their ordinates, or gage heights. This law of the parallelism of ratings is the fundamental basis of all ratings and estimates at stations with semipermanent and shifting channels. It is not absolutely correct but, with few exceptions, answers all the practical requirements of estimates made at low and medium stages after a change at a high stage. This law appears to hold equally true whether the change occurs at the measuring section or at some controlling point below. The change is of course fundamentally due to change in the channel caused by cut, or fill, or both, at and near the measuring section. For all except small streams the changes in section usually occur at the bottom. The following simple but typical examples illustrate this law:

(*a*) If 0.5 foot of planking were to be nailed on the bottom of a well-rated wooden flume of rectangular section there would result, other conditions of flow being equal, new curves of discharge, area, and velocity, each plotting 0.5 foot above the original curves when referred to the original gage. In other words, this condition would be analogous to a uniform fill or cut in a river channel which either reduces or increases all three values of discharge, area, and velocity for any gage height. In practice, however, such ideal conditions rarely exist.

(*b*) In the case of a cut or fill at the measuring section there is a marked tendency toward decrease or increase, respectively, of the velocity. In other words, the velocity has a compensating effect and if the compensation is exact at all stages the discharge at a given stage will be the same under both the new and the old conditions.

(*c*) In the case of uniform change along the crest of a weir or rocky controlling point, the area curve will remain the same as before the change, and it can be shown that here again the change in velocity curve is such that it will produce a new discharge curve essentially parallel to the original discharge curve with respect to their ordinates.

Of course in actual practice such simple changes of section do not occur. The changes are complicated and lack uniformity, a cut at one place being largely offset by a fill at another and vice versa. If these changes are very radical and involve large percentages of the total area—as, for example, on small streams—there may result

a wide departure from the law of parallelism of ratings. In complicated changes of section the corresponding changes in velocity which tend to produce a new parallel discharge curve may interfere with each other materially, causing eddies, boils, backwater, and radical changes in slope. In such extreme conditions, however, the measuring section would more properly fall under class 4 and would require very frequent measurements of discharge. Special stress is laid on the fact that in the lack of other data to the contrary the utilization of this law will yield the most probable results.

Slight changes at low or medium stages of an oscillating character are usually averaged by a mean curve drawn among them parallel to the standard curve, and if the individual measurements do not vary more than 5 per cent from the rating curve the results are considered good for stations of this class.

Class 4 comprises stations that have soft, muddy, or sandy beds. Good results can be obtained from such sections only by frequent discharge measurements, the frequency varying from a measurement every two or three weeks to a measurement every day, according to the rate of diurnal change in conditions of flow. These measurements are plotted and a mean or standard curve drawn among them. It is assumed that there is a different rating curve for every day of the year and that this rating is parallel to the standard curve with respect to their ordinates. On the day of a measurement the rating curve for that day passes through that measurement. For days between successive measurements it is assumed that the rate of change is uniform, and hence the ratings for the intervening days are equally spaced between the ratings passing through the two measurements. This method must be modified or abandoned altogether under special conditions. Personal judgment and a knowledge of the conditions involved can alone dictate the course to pursue in such cases. For illustrative example of a station of this type, showing the Bolster method of determining the daily discharge graphically, see Water-Supply Paper 249.

The computations have, as a rule, been carried to three significant figures. Computation machines, Crelle's tables, and the 20-inch slide rule have been generally used. All computations are carefully checked.

After the computations have been completed they are entered in tables and carefully studied and intercompared to eliminate or account for all gross errors so far as possible. Missing periods are filled in, so far as is feasible, by means of comparison with adjacent streams. The attempt is made to complete years or periods of discharge, thus eliminating fragmentary and disjointed records. Full notes accompanying such estimates follow the monthly discharge tables.

For most of the northern stations estimates have been made of the monthly discharge during frozen periods. These are based on measurements under ice conditions wherever available, daily records of temperature and precipitation obtained from the United States Weather Bureau climate and crop reports, observers' notes of conditions, and a careful and thorough intercomparison of results with adjacent streams. Although every care possible is used in making these estimates they are often very rough, the data for some of them being so poor that the estimates are liable to as much as 25 to 50 per cent error. It is believed, however, that estimates of this character are better than none at all, and serve the purpose of indicating in a relative way the proportionate amount of flow during the frozen period. These estimates are, as a rule, included in the annual discharge. The large error of the individual months has a relatively small effect on the annual total, and it is for many purposes desirable to have the yearly discharge computed even though some error is involved in doing so.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous tests and experiments have been made to test the accuracy of current-meter work. These show that it compares very favorably with the results from standard weirs, and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where uncertainty regarding the coefficient and complicated conditions of flow prevail.

The work is, of course, dependent on the reliability of the observers. With relatively few exceptions, the observers perform their work honestly. Care is taken, however, to watch them closely and to inquire into any discrepancies. It is, of course, obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the rating tables and an accuracy column is inserted in the monthly discharge table. In the rating tables "well defined" indicates in general that the rating is probably accurate within 5 per cent; "fairly well

defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly-discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

In general the policy is followed of making available for the public the base data which are collected in the field each year by the Survey engineers. This is done to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the data given in these papers will verify all ratings and make such adjustments in earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for five or ten year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The values in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates. This is particularly true of the maximum and minimum figures, which in the very nature of the method of collecting these data are liable to large errors. The maximum value should be increased considerably for many stations in considering designs for spillways, and the minimum value should be considered for a group of, say, seven days and not for one day.

The rating table, provided the engineer accepts it, is published primarily to allow him to apply it directly to the daily gage heights and rearrange the daily discharges in order of magnitude or by some other method.

COOPERATION AND ACKNOWLEDGMENTS.

Assistance has been rendered or records furnished by the following persons, to whom special acknowledgment is due: Members of the United States Corps of Engineers; the United States Weather Bureau; Dr. Eugene A. Smith, state geologist, Alabama; Dr. Joseph Hyde Pratt, state geologist, North Carolina; E. A. Killebrew; Tennessee Coal, Iron and Railroad Company.

DIVISION OF WORK.

The field data in the James and Roanoke river drainage basins were collected under the direction of J. C. Hoyt, engineer, assisted by Robert Follansbee, R. G. Knight, A. T. Barrows, and R. J. Taylor.

The field data for drainage basins south of Roanoke River were collected under the direction of M. R. Hall, district engineer, assisted by Warren E. Hall, W. A. Lamb, F. A. Murray, B. M. Hall, jr., and F. P. Thomas.

The ratings, special estimates, and studies of the completed data were made by M. R. Hall and R. H. Bolster. The computations and the preparation of the completed data for publication were made under the direction of R. H. Bolster, assistant engineer, assisted by H. D. Padgett, G. C. Stevens, G. L. Parker, and M. I. Walters.

SOUTH ATLANTIC STATES DRAINAGE.

JAMES RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The basin of James River, the most important stream in Virginia, extends entirely across the southern part of the State from east to west. It is bounded on the north by the Potomac and York River basins and on the south by that of the Roanoke. Its entire area is approximately 9,700 square miles.

James River proper is formed by the junction of Jackson and Cowpasture rivers in the northern part of Botetourt County. Jackson River has a long and narrow basin bounded on the west by the main range of the Allegheny Mountains and on the east by a secondary range of the same system. Still other ranges divide its basin into parallel valleys having steep sides and heavy slopes.

The basin of Cowpasture River is similar to that of Jackson River, being long and narrow. It parallels the Jackson basin on the east and extends as far east as the Blue Ridge Mountains.

The course of James River from the junction of Jackson and Cowpasture rivers is in general easterly, leading into the lower part of Chesapeake Bay. Its length is about 335 miles. The important tributaries in descending order are: Craig Creek and North, Pedlar,

Buffalo, Rockfish, Hardware, Slate, Rivanna, Willis, Appomattox, and Chickahominy rivers.

James River traverses three distinct geologic provinces—the Allegheny Mountain region, extending from the western edge of the basin to the Blue Ridge Mountains; the Piedmont Plateau, which extends from the Blue Ridge to the fall line at Richmond; and the Coastal Plain east of Richmond. Within the first region the basin is very broken and has steep slopes; here are found deposits of limestone, marble, and lead ores, and anthracite and bituminous coal. Within the Piedmont Plateau region the topography is rolling and the uplands are rounded, with a resulting small range in altitude; this section contains the bituminous coal fields of Goochland, Chesterfield, Powhatan, and Prince Edward counties. The characteristic strata of the Coastal Plain are horizontal beds of clay and sand abounding in fossil shells; the region is generally low and in some parts swampy. The range of altitude for the entire basin is from sea level to 4,000 feet on the crest of the mountains.

With the exception of the mountain sides in the upper part of the basin, which are forested, the drainage area is, for the most part, cleared and under cultivation.

The mean annual rainfall, as shown by the records of the United States Weather Bureau, ranges from 40 to 50 inches, being heaviest at the mouth of the river and decreasing to 45 inches at Richmond. Between this latter point and the upper part of the basin the range is between 40 and 45 inches.

Owing to the southern latitude, James River is not seriously affected by ice; frozen periods usually last from only a few days to two or three weeks.

A study of the topographic sheets which cover nearly the entire drainage basin shows that the upper valleys are so narrow and the headwaters have so much fall that there are few sites that could be utilized for reservoirs of any considerable capacity without building dams of great height and length.

Near Clifton Forge, and again near Balcony Falls, the James flows through ridges of the Alleghenies with sharp falls over beds of solid rock. At other points similar though less pronounced falls and rapids occur as the river cuts through the lesser foothills. The fall line is crossed at Richmond.

A reconnaissance made in 1897 showed 18 dams across James River between Clifton Forge and Richmond. Many of these dams were built for the purpose of diverting water into the old James and Kanawha Canal, which followed the river from Richmond to Buchanan and at one time was utilized throughout that entire distance. It has now been abandoned and its right of way is owned by the Chesapeake and Ohio Railway. The use of the dams was

abandoned with the canal, and although many of them are in good repair, they have not been improved for power purposes.[a]

The greater part of the Coastal Plain is underlain by water-bearing strata which have been penetrated by numerous wells. In the Piedmont Plateau there are few deep wells, but it is probable that moderate amounts of water could be obtained in a considerable percentage of the wells sunk. Within the Appalachian Mountain belt, springs abound which constitute the main source of water supply of the inhabitants. Many of the springs at the higher altitudes yield warm waters, and at a number of places have been developed as resorts. At other springs the waters are bottled and sold for medicinal purposes.

The following gaging stations have been maintained in James River basin:[b]

Jackson River at Covington, Va., 1907–8.
James River at Buchanan, Va., 1895–1908.
James River at Holcomb Rock, Va., 1900–1908.
James River at Cartersville, Va., 1899–1908.
Cowpasture River near Clifton Forge, Va., 1907–8.
North of James River near Glasgow, Va., 1895–1905.
Appomattox River at Mattoax, Va., 1900–1905.

JACKSON RIVER AT COVINGTON, VA.

The gaging station on Jackson River was established May 11, 1907, at the footbridge leading to the West Virginia Pulp and Paper Company's mill just above the Chesapeake and Ohio Railway bridge at Covington, and was discontinued July 31, 1908. It was established in cooperation with the United States Forest Service for the purpose of studying the run-off in the southern Appalachian region.

The nearest important tributary is Dunlap Creek, which enters Jackson River a few hundred yards below the railroad bridge.

During the period covered by the record there were slight ice conditions for a few days, but these did not materially affect the flow.

The datum of the gage remained unchanged during the period covered by the records. Measuring conditions are good and a good low-water rating has been developed.

Discharge measurements of Jackson River at Covington, Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 11	R. J. Taylor	151	448	1.80	924
June 26	R. G. Knight	153	579	2.60	1,820
July 17	do	127	300	.61	359
July 25	do	115	297	.55	285

[a] For a full report of the 1897 reconnaissance, including brief descriptions of the various dams and the profile of the river, see 19th Ann. Rept. U. S. Geol. Survey, pt. 4, pp. 162–173; also Hydrography of Virginia, Bull. Geol. Survey Virginia No. 3, 1906, pp. 95–99.

[b] All records and discharge data collected in the James River basin prior to 1906 have been revised by engineers of the United States Geological Survey and republished in Hydrography of Virginia, Bull. Geol. Survey Virginia No. 3, 1906, pp. 94–163.

Daily gage height, in feet, of Jackson River at Covington, Va., for 1907 and 1908.

[Observer, James E. Steeley.]

Day.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	0.80	1.15	0.58	0.50	0.68	0.40	1.30
2	.....	.....	.....	.....	.....	3.72	1.02	.48	.40	.60	.40	1.22
3	.....	.....	.....	.....	.....	2.45	1.00	.40	.40	.48	2.60	1.12
4	.....	.....	.....	.....	.....	1.95	.92	.35	.60	.50	1.80	1.02
5	.....	.....	.....	.....	.....	1.90	.85	.38	.95	.50	1.45	.90
6	.....	.....	.....	.....	.....	1.80	.80	.42	.72	.45	1.22	.85
7	.....	.....	.....	.....	.....	1.50	.80	.60	.50	.45	1.15	.80
8	.....	.....	.....	.....	.....	2.33	.78	.48	.50	.55	1.02	.75
9	.....	.....	.....	.....	.....	3.52	.72	.48	.50	1.48	.95	.75
10	.....	.....	.....	.....	.....	2.50	.95	.55	.50	1.15	1.10	2.30
11	.....	.....	.....	.....	1.80	2.60	.80	.80	.65	.98	2.35	3.70
12	.....	.....	.....	.....	1.65	3.25	.78	.75	.88	.82	1.88	2.62
13	.....	.....	.....	.....	1.48	4.23	.78	.65	.85	.75	1.55	2.08
14	.....	.....	.....	.....	1.38	6.50	.75	.52	.68	.62	1.40	1.92
15	.....	.....	.....	.....	1.28	4.23	.70	.48	.60	.58	1.22	1.75
16	.....	.....	.....	.....	1.22	3.00	.68	.42	.48	.52	1.15	1.62
17	.....	.....	.....	.....	1.20	2.35	.60	.48	.45	.50	1.00	1.48
18	.....	.....	.....	.....	1.12	2.00	.72	.40	.50	.45	1.00	1.35
19	.....	.....	.....	.....	1.10	1.75	1.02	.38	.50	.45	1.62	1.28
20	.....	.....	.....	.....	1.05	1.65	.90	.30	.50	.45	1.75	1.20
21	.....	.....	.....	.....	.95	1.48	.85	.30	.55	.40	1.62	1.15
22	.....	.....	.....	.....	.88	1.55	.78	.45	.50	.40	1.68	1.15
23	.....	.....	.....	.....	.82	2.30	.62	.45	1.62	.40	1.78	3.30
24	.....	.....	.....	.....	.80	2.02	.60	.92	2.00	.38	3.05	4.85
25	.....	.....	.....	.....	.78	2.73	.58	.80	1.45	.35	2.75	3.30
26	.....	.....	.....	.....	.80	2.45	.50	1.32	1.15	.35	2.28	2.45
27	.....	.....	.....	.....	.82	1.90	.50	1.05	.92	.35	1.95	2.12
28	.....	.....	.....	.....	.80	1.55	.45	.85	.85	.38	1.72	1.98
29	.....	.....	.....	.....	.78	1.38	.48	.72	.75	.40	1.55	1.95
30	.....	.....	.....	.....	.75	1.30	.82	.60	.75	.40	1.32	2.42
31	.....	.....	.....	.....	.75	.....	.68	.52	.....	.35	.....	2.83
1908.												
1	2.40	1.15	1.35	4.18	1.80	1.50	.62	.....	.....	.....	.....	.....
2	2.12	1.05	2.35	3.45	1.75	1.30	.60	.....	.....	.....	.....	.....
3	1.88	1.00	3.48	2.95	1.70	1.18	.55	.....	.....	.....	.....	.....
4	1.78	1.20	2.98	2.48	1.58	1.58	.50	.....	.....	.....	.....	.....
5	1.75	1.12	2.80	2.15	1.50	2.20	.80	.....	.....	.....	.....	.....
6	1.58	1.10	4.67	1.95	1.48	1.85	.82	.....	.....	.....	.....	.....
7	1.55	1.15	4.80	1.75	3.18	1.60	1.08	.....	.....	.....	.....	.....
8	1.60	1.08	4.15	1.62	3.55	1.40	.88	.....	.....	.....	.....	.....
9	1.52	.90	3.25	1.60	2.68	1.30	.78	.....	.....	.....	.....	.....
10	1.25	1.10	2.87	1.52	2.40	1.28	.68	.....	.....	.....	.....	.....
11	1.20	1.05	2.50	1.68	2.62	1.18	.60	.....	.....	.....	.....	.....
12	6.85	1.30	2.32	1.75	2.22	1.20	.55	.....	.....	.....	.....	.....
13	4.75	2.52	2.18	1.78	1.95	1.10	.48	.....	.....	.....	.....	.....
14	3.20	3.55	1.95	1.78	1.75	1.05	.45	.....	.....	.....	.....	.....
15	2.42	7.00	1.80	.....	1.62	1.08	.48	.....	.....	.....	.....	.....
16	2.18	5.30	1.72	.....	1.52	1.10	.40	.....	.....	.....	.....	.....
17	2.00	3.35	1.75	1.90	1.45	.98	.35	.....	.....	.....	.....	.....
18	1.85	2.60	2.05	1.85	1.48	.85	.35	.....	.....	.....	.....	.....
19	1.70	2.32	2.52	1.80	1.50	.78	.35	.....	.....	.....	.....	.....
20	1.55	2.10	2.60	1.68	1.78	.78	.35	.....	.....	.....	.....	.....
21	1.50	1.82	2.30	1.55	1.72	.85	.32	.....	.....	.....	.....	.....
22	1.52	1.75	2.15	1.42	1.92	.72	.40	.....	.....	.....	.....	.....
23	1.65	1.65	2.02	1.35	2.30	.85	.52	.....	.....	.....	.....	.....
24	1.60	1.60	2.02	1.30	2.10	.68	.45	.....	.....	.....	.....	.....
25	1.40	1.48	1.87	1.35	1.92	.65	.68	.....	.....	.....	.....	.....
26	1.45	1.50	1.70	2.40	1.80	.70	.55	.....	.....	.....	.....	.....
27	1.82	1.58	1.60	2.00	1.80	.88	1.15	.....	.....	.....	.....	.....
28	1.65	1.48	1.55	1.75	1.88	.70	1.32	.....	.....	.....	.....	.....
29	1.58	1.38	1.55	1.60	2.52	.60	.92	.....	.....	.....	.....	.....
30	1.38	.....	1.55	1.50	1.95	.58	.68	.....	.....	.....	.....	.....
31	1.25	.....	3.22	.....	1.75	.....	.62	.....	.....	.....	.....	.....

Daily discharge, in second-feet, of Jackson River at Covington, Va., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	390	540	314	290	348	260	615
2	.....	.....	.....	.....	.....	.....	479	284	260	320	260	575
3	.....	.....	.....	.....	.....	1,610	470	260	260	284	1,800	525
4	.....	.....	.....	.....	.....	1,080	438	245	320	290	955	479
5	.....	.....	.....	.....	.....	1,040	410	254	450	290	708	430
6	.....	.....	.....	.....	.....	955	390	266	362	275	575	410
7	.....	.....	.....	.....	.....	740	390	320	290	275	540	390
8	.....	.....	.....	.....	.....	1,470	383	284	.....	305	479	372
9	.....	.....	.....	.....	.....	.....	362	284	.....	727	450	372
10	.....	.....	.....	.....	.....	1,670	450	305	290	540	515	1,440
11	.....	.....	.....	.....	955	1,800	390	390	338	462	1,490	.....
12	.....	.....	.....	.....	845	.....	383	372	422	398	1,020	1,820
13	.....	.....	.....	.....	727	.....	383	338	410	372	775	1,210
14	.....	.....	.....	.....	663	.....	372	296	348	327	675	1,050
15	.....	.....	.....	.....	605	.....	355	284	320	314	575	918
16	.....	.....	.....	.....	575	2,360	348	266	284	296	540	824
17	.....	.....	.....	.....	565	1,490	320	284	275	290	470	727
18	.....	.....	.....	.....	525	1,130	362	260	290	275	470	645
19	.....	.....	.....	.....	515	918	479	254	290	275	824	605
20	.....	.....	.....	.....	492	845	430	230	290	275	918	565
21	.....	.....	.....	.....	450	727	410	230	305	260	824	540
22	.....	.....	.....	.....	422	775	383	275	290	260	866	540
23	.....	.....	.....	.....	398	1,440	327	275	824	260	940	.....
24	.....	.....	.....	.....	390	1,150	320	438	1,130	254	.....	.....
25	.....	.....	.....	.....	383	1,970	314	390	708	245	2,000	.....
26	.....	.....	.....	.....	390	1,610	290	627	540	245	1,410	1,610
27	.....	.....	.....	.....	398	1,040	290	492	438	245	1,080	1,240
28	.....	.....	.....	.....	390	775	275	410	410	254	895	1,110
29	.....	.....	.....	.....	383	663	284	362	372	260	775	1,080
30	.....	.....	.....	.....	372	615	398	320	372	260	627	1,570
31	.....	.....	.....	.....	372	.....	348	296	.....	245	.....	2,110
1908.												
1	1,550	540	645	.....	955	740	327	.....	.....	.....	.....	.....
2	1,240	492	1,490	.....	918	615	320	.....	.....	.....	.....	.....
3	1,020	470	.....	2,280	880	555	305	.....	.....	.....	.....	.....
4	940	565	2,330	1,650	796	796	290	.....	.....	.....	.....	.....
5	918	525	2,060	1,280	740	1,320	390	.....	.....	.....	.....	.....
6	796	515	.....	1,080	727	995	398	.....	.....	.....	.....	.....
7	775	540	.....	918	.....	810	506	.....	.....	.....	.....	.....
8	810	506	.....	824	.....	675	422	.....	.....	.....	.....	.....
9	754	430	.....	810	1,900	615	383	.....	.....	.....	.....	.....
10	590	515	2,170	754	1,550	605	348	.....	.....	.....	.....	.....
11	565	492	1,670	866	1,820	555	320	.....	.....	.....	.....	.....
12	.....	615	1,460	918	1,350	565	305	.....	.....	.....	.....	.....
13	.....	1,700	1,300	940	1,080	515	284	.....	.....	.....	.....	.....
14	.....	.....	1,080	940	918	492	275	.....	.....	.....	.....	.....
15	1,570	.....	955	970	824	506	284	.....	.....	.....	.....	.....
16	1,300	.....	895	1,010	754	515	260	.....	.....	.....	.....	.....
17	1,130	.....	918	1,040	708	462	245	.....	.....	.....	.....	.....
18	995	1,800	1,180	995	727	410	245	.....	.....	.....	.....	.....
19	880	1,460	1,700	955	740	383	245	.....	.....	.....	.....	.....
20	775	1,220	1,800	866	940	383	245	.....	.....	.....	.....	.....
21	740	971	1,440	775	895	410	236	.....	.....	.....	.....	.....
22	754	918	1,280	688	1,050	362	260	.....	.....	.....	.....	.....
23	845	845	1,150	645	1,440	410	296	.....	.....	.....	.....	.....
24	810	810	1,150	615	1,220	348	275	.....	.....	.....	.....	.....
25	675	727	1,010	645	1,050	338	348	.....	.....	.....	.....	.....
26	708	740	880	1,550	955	355	305	.....	.....	.....	.....	.....
27	971	796	810	1,130	955	422	540	.....	.....	.....	.....	.....
28	845	727	775	918	1,020	355	627	.....	.....	.....	.....	.....
29	796	663	775	810	1,700	320	438	.....	.....	.....	.....	.....
30	663	.....	775	740	1,080	314	348	.....	.....	.....	.....	.....
31	590	.....	.....	.....	918	.....	327	.....	.....	.....	.....	.....

NOTE.—Daily discharge for 1907 and 1908 based on a well-defined rating curve. The discharge was greater than 2,500 second-feet for all missing days from May 11, 1907, to July 31, 1908.

JAMES RIVER AT BUCHANAN, VA.

The station, which is located at the highway bridge near the Chesapeake and Ohio Railway depot at Buchanan, was established August 18, 1895, in order to study the run-off of the upper James River for water power and other purposes. Previous to July 15, 1906, the records of daily gage height were taken by the Geological Survey, but since that time they have been obtained from the Weather Bureau.

The nearest tributary is Purgatory Creek, which enters James River one-half mile below the bridge. The nearest important tributary is North Branch of James River, 20 miles below Buchanan.

The ice conditions at this station are slight and usually last for short periods only.

The datum of the original wire gage was lowered 2 feet April 3, 1897, to avoid negative readings. Since that date the datum of the gage has remained constant. The wire gage was replaced by a chain gage November 21, 1903. The bed of the river under the bridge is composed of rock overlain with a heavy deposit of mud. There is a rock control several hundred feet below the station, but the plotting of 1906 and 1907 measurements indicates changing conditions of flow. The ratings developed for 1906, 1907, and 1908 are fairly accurate for the periods which they cover.

Discharge measurements of James River at Buchanan, Va., in 1907.[a]

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 9	R. J. Taylor	334	1,880	5.12	5,620
June 24	R. G. Knight	314	1,540	4.44	3,870
July 19	do	317	1,100	2.97	1,570
July 24	do	311	896	2.45	972

[a] Discharge data collected prior to 1906 have been revised by engineers of the United States Geological Survey and republished in Hydrography of Virginia, Bull. Geol. Survey Virginia No. 3, 1906, pp. 102–118.

Daily gage height, in feet, of James River at Buchanan, Va., for 1906,[a] *1907, and 1908.*

[Observer, D. D. Booze.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.							1906.						
1		2.6	4.3	5.4	3.3	3.2	17	2.3	4.5	2.7	3.0	2.7	2.7
2		2.5	3.8	5.0	3.2	3.1	18	2.2	4.2	3.1	3.0	2.7	7.3
3		2.5	3.6	4.8	3.1	3.0	19	2.2	4.0	3.0	9.8	2.9	6.6
4		2.5	3.3	8.0	3.0	2.9	20	2.2	3.8	3.0	15.6	6.9	5.6
5		2.3	3.1	9.1	3.0	2.9	21	2.9	3.8	2.9	10.7	7.4	5.2
6		2.3	3.0	7.1	2.9	2.8	22	2.7	3.7	3.0	7.3	5.8	4.8
7		3.6	2.9	6.2	2.9	2.8	23	2.6	4.1	3.0	5.7	4.9	4.4
8		3.3	2.7	5.4	2.8	2.7	24	2.4	4.3	3.1	5.2	4.4	4.2
9		3.3	2.6	4.8	2.8	2.7	25	2.3	4.1	3.1	4.8	4.1	4.0
10		3.0	2.5	4.3	2.7	2.6	26	2.3	3.6	2.8	4.4	3.8	3.5
11		2.8	2.6	3.9	2.7	2.7	27	2.3	3.3	2.6	4.1	3.5	3.2
12		2.7	2.5	3.6	2.8	2.7	28	2.3	3.6	2.7	3.9	3.3	3.6
13		2.9	2.8	3.4	2.8	2.7	29	2.3	4.6	3.9	3.7	3.3	3.5
14		3.4	3.6	3.2	2.8	2.7	30	3.1	4.4	3.4	3.6	3.2	3.5
15		3.6	3.0	3.1	2.7	2.7	31	3.1	4.3		3.4		3.5
16	2.3	4.5	2.8	3.0	2.7	2.7							

[a] For 1906 gage heights prior to July 16, see Water-Supply Paper U. S. Geol. Survey No. 203.

Daily gage height, in feet, of James River at Buchanan, Va., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.6	3.2	4.5	4.5	3.7	2.8	3.3	2.3	2.0	2.9	2.2	3.5
2	5.2	3.5	4.7	5.0	3.8	6.8	3.2	2.3	2.0	2.8	2.3	3.3
3	4.8	3.9	6.9	4.6	3.6	7.0	3.1	2.3	2.0	2.7	3.1	3.2
4	4.6	3.7	6.0	4.3	3.6	5.3	3.0	2.3	2.0	2.6	4.3	3.1
5	4.4	3.9	5.2	4.3	3.5	4.7	2.9	2.3	2.4	2.5	3.5	3.0
6	4.2	3.7	4.5	4.3	3.5	4.8	2.8	2.3	3.0	2.5	3.2	2.9
7	4.0	3.4	4.4	8.7	5.6	4.4	2.8	2.3	2.5	2.5	2.8	2.8
8	3.8	3.3	4.4	7.4	5.7	4.1	2.7	2.3	2.4	2.5	2.8	2.8
9	3.8	3.4	4.4	8.8	5.1	6.8	2.7	2.3	2.3	2.5	2.7	2.8
10	3.8	3.4	4.4	8.6	4.9	5.4	2.6	2.4	2.2	2.5	2.8	3.6
11	3.8	4.0	5.5	6.8	4.7	4.8	2.6	2.7	2.5	2.5	2.8	9.3
12	3.7	4.2	5.8	5.8	4.5	5.4	2.8	2.6	4.0	2.5	2.7	6.4
13	3.7	3.9	5.5	5.3	4.3	6.0	2.8	2.5	3.5	2.5	3.6	5.1
14	4.1	3.6	6.7	5.0	4.0	16.4	2.8	2.5	3.0	2.4	3.4	5.0
15	4.4	3.6	6.5	4.7	3.8	10.4	2.6	2.4	2.8	2.3	3.2	4.8
16	5.3	3.6	6.0	4.4	3.7	7.2	2.6	2.3	2.7	2.3	3.0	5.0
17	7.2	3.6	5.2	4.2	3.6	5.8	2.6	2.2	2.5	2.3	2.9	4.8
18	7.4	3.6	4.8	4.2	3.4	5.0	2.6	2.2	2.5	2.3	2.9	4.1
19	7.5	3.5	4.4	4.0	3.3	4.5	2.8	2.2	2.5	2.3	2.9	4.0
20	6.8	3.5	5.2	4.0	3.2	4.3	2.7	2.2	2.4	2.3	4.2	3.9
21	5.8	3.5	5.7	3.9	3.2	4.0	2.7	2.2	2.4	2.3	4.0	3.8
22	4.8	3.5	5.1	3.8	3.1	3.7	2.6	2.2	2.4	2.2	4.0	3.7
23	4.6	3.3	4.6	3.7	3.0	3.9	2.6	2.2	6.1	2.2	4.0	5.0
24	4.2	3.3	4.3	4.5	3.0	4.6	2.5	2.4	8.4	2.2	6.7	11.9
25	4.0	3.3	3.9	5.3	2.9	4.6	2.4	2.7	5.3	2.2	7.7	8.0
26	3.8	3.5	3.8	4.8	2.9	4.5	2.4	3.2	4.3	2.2	6.0	6.2
27	3.6	3.9	3.7	4.5	2.9	4.1	2.4	3.0	3.5	2.2	5.0	5.3
28	3.5	3.9	3.6	4.3	2.9	3.8	2.3	2.6	3.2	2.2	4.5	4.8
29	3.3	.....	3.5	4.1	2.9	3.5	2.3	2.4	3.0	2.2	4.0	4.5
30	3.2	.....	3.4	3.8	2.9	3.3	2.3	2.3	2.9	2.2	3.8	4.6
31	3.2	.....	3.3	.....	2.8	.....	2.3	2.3	.....	2.2	.....	6.6
1908.												
1	6.0	4.0	4.0	9.5	4.2	4.4	2.6	2.6	2.7	2.2	4.1	2.7
2	5.2	3.7	4.0	9.4	4.2	3.7	2.8	2.5	2.6	2.2	3.7	2.6
3	4.7	3.3	4.6	7.8	4.2	3.5	2.7	2.4	2.5	2.2	3.4	2.6
4	4.3	3.4	5.9	6.6	4.2	3.9	2.7	2.3	2.4	2.1	3.2	2.5
5	4.3	3.5	6.0	5.6	4.1	5.6	3.3	2.3	2.3	2.1	3.0	2.5
6	4.2	3.5	6.7	5.1	4.1	5.5	3.6	2.2	3.7	2.1	2.8	2.5
7	4.2	3.5	8.6	4.7	4.2	4.7	3.7	2.2	3.0	2.1	2.7	2.5
8	5.5	3.6	8.0	4.4	10.3	4.3	3.5	2.2	2.7	2.0	2.7	2.5
9	5.0	3.5	6.8	4.2	7.1	3.9	3.2	2.5	2.6	2.0	2.6	3.4
10	4.4	3.4	6.1	4.1	5.8	3.7	3.0	2.8	2.5	2.1	2.6	3.3
11	4.0	3.4	5.4	4.1	5.7	3.5	2.8	3.2	2.4	2.4	2.5	3.1
12	8.6	3.4	5.0	4.2	5.0	3.6	2.6	3.0	2.3	2.8	2.4	3.5
13	16.7	4.5	4.8	4.2	4.6	3.9	2.5	2.8	2.3	2.6	2.4	4.8
14	9.2	7.5	4.6	4.2	4.3	3.4	2.5	2.5	2.3	2.4	2.3	4.2
15	6.8	11.0	4.4	4.0	4.0	3.3	2.4	2.4	2.2	2.3	2.3	3.8
16	5.9	18.3	4.2	4.0	4.0	3.9	2.4	2.4	2.2	2.2	2.3	3.4
17	5.4	8.7	4.2	4.3	3.8	3.6	2.3	2.4	2.2	2.2	2.2	3.3
18	5.0	6.7	4.6	4.2	3.8	3.3	2.3	2.4	2.2	2.2	2.5	3.2
19	4.6	5.7	5.0	4.2	4.2	3.1	2.3	2.3	2.2	2.1	3.9	3.1
20	4.4	5.3	6.7	4.1	5.2	3.1	2.3	2.3	2.1	2.1	4.0	3.0
21	4.2	4.9	5.7	4.1	5.3	3.0	2.3	2.2	2.1	2.1	4.0	3.0
22	4.2	4.5	5.4	3.9	5.3	3.0	2.3	2.1	2.1	2.1	3.6	3.0
23	4.1	4.2	5.2	3.8	6.0	2.9	2.3	2.3	2.1	2.1	3.4	3.0
24	4.0	4.1	5.2	3.7	6.6	2.8	2.4	2.1	2.1	4.0	3.2	3.0
25	4.0	4.0	5.2	3.7	5.6	2.8	2.3	2.1	2.0	5.5	3.1	3.3
26	4.0	4.0	4.9	3.8	4.9	2.7	2.3	4.4	2.0	4.0	3.0	3.8
27	4.0	4.4	4.7	3.8	4.4	2.8	2.7	4.0	2.0	3.6	2.9	4.5
28	4.1	4.2	4.3	3.8	4.7	2.8	4.3	3.8	2.0	3.8	2.8	4.1
29	4.3	4.1	4.2	3.8	4.4	2.7	3.6	3.4	2.2	4.1	2.8	4.4
30	4.1	.....	4.2	3.8	5.4	2.6	3.1	3.0	2.2	6.5	2.7	5.0
31	4.1	.....	4.2	.....	4.6	.....	2.7	2.8	.....	4.5	.....	6.6

Rating tables for James River at Buchanan, Va.

FROM 1899 TO 1906.[a]

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.10	505	3.70	2,460	5.30	5,785	7.80	12,520
2.20	575	3.80	2,640	5.40	6,015	8.00	13,140
2.30	655	3.90	2,825	5.50	6,250	8.20	13,780
2.40	740	4.00	3,015	5.60	6,485	8.40	14,420
2.50	835	4.10	3,210	5.70	6,725	8.60	15,080
2.60	935	4.20	3,410	5.80	6,965	8.80	15,760
2.70	1,040	4.30	3,610	5.90	7,210	9.00	16,470
2.80	1,155	4.40	3,815	6.00	7,460	10.00	20,300
2.90	1,275	4.50	4,025	6.20	7,970	11.00	24,420
3.00	1,400	4.60	4,235	6.40	8,495	12.00	28,850
3.10	1,530	4.70	4,450	6.60	9,030	13.00	33,600
3.20	1,670	4.80	4,665	6.80	9,575	14.00	38,600
3.30	1,815	4.90	4,885	7.00	10,130	15.00	43,800
3.40	1,965	5.00	5,105	7.20	10,700	16.00	49,200
3.50	2,125	5.10	5,330	7.40	11,290	17.00	54,700
3.60	2,290	5.20	5,555	7.60	11,900	18.00	60,300

FOR 1907.[b]

2.00	585	3.20	1,890	4.40	4,000	6.00	7,600
2.10	660	3.30	2,035	4.50	4,200	6.20	8,100
2.20	740	3.40	2,185	4.60	4,400	6.40	8,620
2.30	825	3.50	2,340	4.70	4,610	6.60	9,140
2.40	915	3.60	2,505	4.80	4,820	6.80	9,680
2.50	1,010	3.70	2,675	4.90	5,040	7.00	10,220
2.60	1,115	3.80	2,850	5.00	5,260	7.20	10,780
2.70	1,225	3.90	3,030	5.20	5,700	7.40	11,340
2.80	1,345	4.00	3,215	5.40	6,160	7.60	11,920
2.90	1,470	4.10	3,405	5.60	6,630	7.80	12,520
3.00	1,605	4.20	3,600	5.80	7,110	8.00	13,140
3.10	1,745	4.30	3,800				

FOR 1908.[c]

2.00	515	2.70	1,135	3.40	2,030	4.10	3,235
2.10	585	2.80	1,245	3.50	2,180	4.20	3,430
2.20	660	2.90	1,360	3.60	2,340	4.30	3,625
2.30	745	3.00	1,480	3.70	2,505	4.40	3,825
2.40	835	3.10	1,610	3.80	2,680	4.50	4,030
2.50	930	3.20	1,745	3.90	2,860	4.60	4,240
2.60	1,030	3.30	1,885	4.00	3,045	4.70	4,450

[a] This table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made 1898 to 1906, and is well defined between gage heights 1.8 feet and 10 feet.

[b] This table is not applicable for ice or obstructed-channel conditions. It is based on four discharge measurements made in 1907 and on high-water measurements made in earlier years; it is well defined between gage heights 2 feet and 10 feet. Above 8 feet this table is the same as that for 1906.

[c] This table is not applicable for ice or obstructed-channel conditions. It is based on one discharge measurement made during 1909 and the form of the 1906 curve. It is well defined between gage heights 1.8 feet and 10 feet. Above gage height 4.7 feet the table is the same as the 1906 table.

Monthly discharge of James River at Buchanan, Va., for 1906, 1907, and 1908.

[Drainage area, 2,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1906.						
January	18,000	1,860	4,750	2.31	2.66	A.
February	3,270	740	1,300	.631	.66	A.
March	12,800	698	4,250	2.06	2.38	A.
April	8,070	1,530	3,390	1.65	1.84	A.
May	2,210	706	1,310	.636	.73	A.
June	4,560	655	1,180	.573	.64	A.
July	3,450	519	861	.418	.48	B.
August	4,240	655	2,260	1.10	1.27	A.
September	3,610	835	1,520	.738	.82	A.
October	47,000	1,400	7,320	3.55	4.09	A.
November	11,300	1,040	2,460	1.19	1.33	A.
December	11,000	935	2,550	1.24	1.43	A.
The year	47,000	519	2,760	1.34	18.33	
1907.						
January	11,600	1,890	4,600	2.23	2.57	A.
February	3,600	1,890	2,520	1.22	1.27	A.
March	9,950	2,040	5,040	2.45	2.82	A.
April	15,800	2,680	5,700	2.77	3.09	A.
May	6,870	1,340	2,780	1.35	1.56	A.
June	51,400	1,340	7,180	3.49	3.89	A.
July	2,040	825	1,220	.592	.68	A.
August	1,890	740	933	.453	.52	A.
September	14,400	585	2,140	1.04	1.16	A.
October	1,470	740	914	.444	.51	A.
November	12,200	740	2,990	1.45	1.62	A.
December	28,400	1,340	5,420	2.63	3.03	A.
The year	51,400	585	3,450	1.68	22.72	
1908.						
January	53,000	3,040	6,670	3.24	3.74	B.
February	62,000	1,880	6,830	3.32	3.58	B.
March	15,100	3,040	5,860	2.84	3.27	A.
April	18,300	2,500	4,840	2.35	2.62	A.
May	21,500	2,680	5,300	2.57	2.96	A.
June	6,480	1,030	2,390	1.16	1.29	A.
July	3,620	745	1,290	.626	.72	B.
August	3,820	585	1,160	.563	.65	B.
September	2,500	515	814	.395	.44	B.
October	8,760	515	1,580	.767	.88	B.
November	3,240	660	1,540	.748	.83	B.
December	9,030	930	2,280	1.11	1.28	A.
The year	62,000	515	3,380	1.64	22.26	

NOTE.—Since no discharge measurements were made during 1908 the above results are liable to more or less error at low stages. The measurement of 1909, which gave a discharge of 690 second-feet at 2.24 feet, was considered to represent normal conditions of flow at low stages better than the 1907 rating, and hence the 1908 rating curve was drawn through it.

JAMES RIVER AT HOLCOMB ROCK, VA.

The station is located at the works of the Wilson Aluminum Company, at Holcomb Rock. It was established in 1899, and from January, 1900, to date two readings daily have been furnished to the United States Geological Survey through the courtesy of George O. Seward, general manager of the company.[a]

[a] Descriptive matter and discharge data collected prior to 1906 have been republished in Hydrography of Virginia, Bull. Geol. Survey Virginia No. 3, 1906, pp. 138–142.

Daily gage height, in feet, of James River at Holcomb Rock, Va., for 1907 and 1908.

[Observer, George L. Price.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.75	2.1	3.5	2.85	2.4	3.1	2.2	1.4	1.1	2.0	1.3	2.4
2	5.7	2.1	3.5	4.05	2.4	8.45	2.15	1.5	1.3	1.9	1.35	2.35
3	5.15	2.4	5.85	3.25	2.35	7.15	1.95	1.3	1.25	1.75	1.85	2.25
4	3.65	2.5	5.3	2.85	2.3	4.9	1.75	.95	1.25	1.65	3.05	2.1
5	3.35	2.55	4.1	2.7	2.15	4.05	1.95	1.35	1.35	1.6	2.4	2.0
6	2.95	2.5	3.6	2.95	2.35	3.75	1.75	1.3	1.95	1.35	1.95	1.9
7	2.85	2.15	3.3	7.0	4.1	3.35	1.65	1.3	1.75	1.6	2.0	1.85
8	2.7	2.1	3.15	6.85	4.95	3.05	1.85	1.3	1.05	1.6	1.75	1.5
9	2.6	2.1	3.0	9.95	4.1	5.45	1.7	1.3	1.3	1.5	1.7	1.95
10	2.5	1.9	3.3	10.15	3.95	5.0	1.7	1.4	1.2	1.5	1.65	5.2
11	2.5	2.55	3.7	6.9	3.95	3.9	1.7	1.35	1.4	1.7	2.9	8.9
12	2.5	2.95	4.8	5.55	3.45	4.35	1.7	1.5	2.25	1.65	3.35	6.5
13	2.45	2.6	4.65	4.6	2.9	6.0	1.75	1.5	2.5	1.35	2.55	5.2
14	2.5	2.4	6.2	4.0	2.65	16.15	1.55	1.5	1.85	1.45	2.3	4.35
15	3.1	2.4	5.7	3.6	2.5	11.1	1.65	1.4	1.4	1.4	2.1	4.6
16	3.95	2.4	5.2	3.25	2.65	6.95	1.6	1.35	1.5	1.4	1.95	4.55
17	6.0	2.2	4.1	2.95	2.45	5.15	1.6	1.3	1.35	1.4	1.65	4.1
18	6.55	2.3	3.7	2.8	2.25	4.05	1.6	1.1	1.3	1.4	2.05	3.55
19	6.8	2.25	3.45	2.75	1.9	3.45	1.7	1.2	1.5	1.4	2.85	3.25
20	6.5	2.2	3.8	2.6	1.95	3.2	2.0	1.2	1.3	1.05	3.0	3.05
21	4.85	2.15	4.75	2.55	1.9	2.75	1.75	1.2	1.3	1.4	3.0	2.7
22	4.0	2.1	4.25	2.55	1.8	2.4	1.7	1.45	1.15	1.35	3.15	2.5
23	3.3	2.0	3.55	2.55	1.8	2.85	1.6	1.4	9.65	1.25	3.3	7.05
24	2.85	1.7	3.05	3.35	1.7	3.25	1.4	1.4	10.35	1.2	7.1	11.65
25	2.55	1.85	2.8	4.2	1.75	3.1	1.4	2.2	5.25	1.2	8.2	8.55
26	2.45	2.1	2.6	3.7	1.55	3.25	1.45	1.8	3.35	1.2	5.95	6.1
27	2.3	2.5	2.45	3.35	1.7	3.1	1.4	1.55	2.5	1.0	4.5	4.85
28	2.2	2.7	2.35	2.85	1.55	2.6	1.15	1.55	2.35	1.35	3.7	4.2
29	2.1	.....	2.25	2.75	1.55	2.45	1.4	1.4	1.35	1.35	3.15	3.7
30	2.0	.....	2.15	2.55	1.5	2.3	1.5	1.4	2.15	1.3	2.85	4.15
31	2.0	.....	2.05	.....	1.55	.....	1.4	1.3	.....	1.3	.....	5.5
1908.												
1	4.9	2.6	3.05	9.0	2.8	3.0	1.7	1.75	1.7	1.6	3.65	1.75
2	4.5	2.7	3.6	9.15	3.2	2.5	1.7	1.4	1.65	1.6	3.1	1.65
3	3.95	2.75	5.3	7.7	2.9	2.2	1.8	1.6	1.6	1.35	2.5	1.7
4	3.5	2.35	6.3	6.05	2.8	2.55	1.7	1.45	1.55	1.3	2.3	1.65
5	3.45	2.45	5.25	4.9	2.8	5.05	2.4	1.4	1.5	1.4	2.15	1.6
6	3.35	2.25	6.9	4.3	2.75	5.2	2.4	1.35	4.0	1.3	2.05	1.65
7	4.85	2.45	8.9	3.8	3.45	3.9	2.55	1.5	2.55	1.3	2.05	1.8
8	5.3	2.4	7.8	3.45	9.4	3.25	2.45	1.5	2.1	1.25	1.75	2.0
9	4.35	2.35	6.55	3.15	6.65	3.0	2.2	1.45	1.9	1.3	1.85	2.3
10	3.65	2.4	5.65	3.0	5.0	2.9	1.95	1.85	1.8	1.4	1.7	2.2
11	3.15	2.4	4.85	2.95	4.45	2.75	1.8	2.15	1.7	1.15	1.75	2.2
12	11.35	2.15	4.3	2.85	3.9	3.15	1.5	1.95	1.6	1.9	1.7	2.45
13	18.25	3.45	3.95	2.95	3.4	3.05	1.8	1.7	1.4	1.6	1.7	3.55
14	10.0	7.8	3.65	2.75	3.05	2.65	1.6	1.7	1.5	1.45	1.7	3.3
15	7.3	13.95	3.4	2.7	2.75	2.7	1.65	1.65	1.45	1.4	1.65	2.75
16	5.8	17.5	3.25	2.7	2.65	3.8	1.45	1.15	1.5	1.4	1.85	2.55
17	5.1	9.25	3.15	2.8	2.5	3.05	1.5	1.55	1.5	1.2	1.7	2.35
18	4.35	6.75	3.4	2.95	2.5	2.75	1.45	1.5	1.5	1.3	1.8	2.2
19	3.95	5.45	4.05	2.8	2.75	2.45	1.3	1.4	1.5	1.0	2.6	2.2
20	3.55	4.9	5.45	2.85	4.1	2.25	1.45	1.4	1.1	1.2	3.2	2.05
21	3.35	4.25	4.9	2.75	5.5	2.05	1.55	1.4	1.6	1.25	3.05	2.0
22	3.15	3.8	4.3	2.6	6.2	2.25	1.5	1.3	1.4	1.05	2.75	2.0
23	3.1	3.45	4.2	2.45	5.85	2.0	1.6	1.35	1.3	1.2	2.55	1.95
24	3.15	3.25	4.25	2.4	6.1	2.0	1.8	1.45	1.25	3.95	2.35	1.6
25	3.05	3.1	4.25	2.35	4.8	2.1	1.85	1.7	1.3	5.75	2.2	2.05
26	2.8	3.3	3.9	2.35	3.75	1.9	1.8	5.4	1.3	3.3	2.1	2.45
27	3.1	3.85	3.5	3.45	3.25	1.9	1.65	4.5	1.15	2.5	1.95	3.25
28	3.8	3.7	3.25	3.0	3.6	1.7	3.05	3.0	1.6	2.2	1.85	3.0
29	3.3	3.25	3.05	2.65	4.2	1.75	2.9	2.4	1.8	3.6	1.75	3.2
30	2.9	.....	3.05	2.6	4.35	1.75	2.2	2.0	1.6	6.95	1.9	3.9
31	2.7	.....	3.5	.....	3.4	.....	1.95	1.9	.....	5.25	.....	6.4

JAMES RIVER AT CARTERSVILLE, VA.

The gaging station at Cartersville was established January 1, 1899, at the highway bridge crossing the James, between Pemberton and Cartersville, about 50 miles above Richmond. The station was established to determine the flow of James River above Richmond for navigation and power purposes.

Willis River enters James River from the south about 1 mile above the station and Rivanna River enters from the north about 7 miles above the station. There are no important tributaries between Cartersville and Richmond.

During severe winters the discharge at this station is affected for short periods by ice conditions.

The datum of the gage has remained the same since the establishment of the station. Conditions of flow change somewhat from year to year, necessitating three or four measurements annually to adequately define the discharge curve. This is due to the great range of stage and débris and sediment carried in the James River. The left bank overflows for several hundred feet at a stage of about 20 feet. Above the overflow point the discharge is uncertain. The right bank does not overflow. Monthly discharge tables for 1907 and 1908 are being withheld until further measurements have been made.[a]

The following discharge measurement was made:

July 27, 1907. Width, 675 feet; area, 1,790 square feet; gage height, 1.76 feet; discharge, 3,220 second-feet.

Daily gage height, in feet, of James River at Cartersville, Va., for 1907 and 1908.

[Observer, B. W. Palmore.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.78	3.15	4.25	3.75	4.00	5.55	3.44	1.62	1.50	2.64	1.32	3.68
2	6.55	3.52	4.88	3.52	4.01	21.00	3.14	1.64	1.32	2.42	1.38	3.35
3	7.35	3.45	5.40	5.02	4.20	15.14	3.10	1.49	1.25	2.38	2.75	3.14
4	6.38	3.42	6.70	4.50	3.92	11.25	2.70	1.68	3.28	2.08	3.09	2.88
5	5.40	3.48	6.79	3.92	3.88	8.10	2.58	1.48	4.28	1.92	2.74	2.60
6	5.15	3.60	5.50	3.68	3.62	7.40	2.46	1.31	2.50	1.82	3.10	2.58
7	4.68	3.48	5.10	5.75	6.55	6.20	2.42	1.48	1.56	1.70	2.58	2.48
8	4.38	3.35	4.65	8.20	5.65	5.78	2.64	1.55	1.58	1.62	2.35	2.38
9	4.12	3.22	4.35	12.40	9.90	5.57	2.26	1.52	1.66	1.72	2.08	2.65
10	3.80	3.75	4.57	14.10	7.62	5.52	2.30	1.79	1.59	1.66	2.18	5.00
11	3.52	4.10	4.75	12.30	6.35	7.10	2.06	2.30	1.62	1.58	2.50	11.00
12	3.65	4.22	4.88	9.00	5.30	6.20	2.08	2.36	1.82	1.68	2.56	10.20
13	3.60	4.35	6.00	7.50	5.20	5.98	2.14	2.55	2.00	1.74	3.34	8.70
14	3.65	4.22	5.90	7.50	4.65	10.02	2.18	2.56	2.38	1.58	3.42	8.70
15	3.55	4.08	7.45	7.75	4.30	16.89	2.14	2.05	1.88	1.69	2.85	9.00
16	4.10	3.98	7.52	5.25	4.05	15.10	1.86	1.71	1.82	1.58	2.58	7.60
17	4.65	3.75	6.58	4.70	4.92	9.00	1.98	1.65	1.62	1.40	2.52	6.30
18	6.21	3.62	5.82	4.42	4.42	7.30	1.98	2.11	1.56	1.52	2.40	6.00
19	7.65	3.58	5.28	4.25	4.00	5.95	1.90	1.68	1.59	1.29	3.72	5.15
20	7.70	3.38	5.15	4.20	3.70	5.30	3.18	1.48	1.52	1.30	3.68	4.76
21	7.40	3.40	4.90	4.00	3.45	4.85	3.05	1.54	1.58	1.36	3.62	4.20
22	6.68	3.38	5.80	3.80	3.10	4.20	2.28	1.58	1.71	1.25	4.20	3.98
23	5.30	3.15	5.60	3.75	3.02	4.50	2.12	1.38	4.20	1.32	4.88	5.86
24	4.48	3.05	5.00	5.50	2.85	4.82	1.90	1.74	19.00	1.30	9.30	13.60
25	3.90	2.88	4.45	5.02	2.85	4.85	1.81	1.69	11.60	1.21	10.70	12.50

[a] All records and discharge data for this station prior to 1906 have been revised by engineers of the United States Geological Survey and republished in Hydrography of Virginia, Bull. Geol. Survey Virginia No. 3, 1906, pp. 142–152.

Daily gage height, in feet, of James River at Cartersville, Va., for 1907 and 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
26	3.85	3.68	4.10	5.42	2.90	4.35	1.72	1.64	6.68	1.24	9.00	10.00
27	3.55	3.78	3.70	5.48	2.98	3.90	1.71	1.92	4.70	1.32	7.50	7.82
28	3.30	4.02	3.62	5.08	2.95	4.80	1.74	2.19	3.76	1.22	5.75	7.52
29	3.00	.....	3.42	4.58	2.62	4.10	1.59	1.90	3.38	1.58	4.98	7.12
30	3.02	.....	3.15	4.35	2.52	3.85	1.50	1.62	3.16	1.60	4.00	5.75
31	3.15	.....	3.15	.....	2.65	.....	1.68	1.48	.....	1.36	.....	6.48
1908.												
1	6.67	3.77	5.79	6.03	4.28	4.35	2.41	2.75	2.68	2.32	6.78	2.18
2	6.53	3.87	5.17	10.63	4.05	3.94	2.92	2.40	2.44	2.04	5.25	2.28
3	5.77	3.93	5.07	10.37	4.12	3.75	2.48	1.98	2.20	1.74	4.30	2.18
4	5.21	3.80	6.27	9.02	4.02	5.72	2.68	1.78	2.05	1.68	3.81	2.02
5	5.55	3.67	6.00	7.65	3.91	7.31	2.48	1.84	1.94	1.62	3.32	2.11
6	5.20	3.69	7.65	6.26	4.02	5.88	2.38	1.79	8.20	1.50	3.04	2.18
7	5.20	3.87	9.00	5.66	5.70	6.46	2.78	1.69	6.88	1.50	2.90	3.92
8	14.13	3.73	10.45	5.25	8.02	5.06	3.10	1.76	4.52	1.50	2.75	4.72
9	8.65	3.57	9.07	4.89	9.06	4.36	2.92	1.75	3.32	1.48	2.58	3.58
10	7.00	3.53	8.33	4.61	7.84	4.18	2.78	2.43	2.78	1.53	2.42	3.15
11	5.66	3.67	7.21	4.42	6.21	4.05	2.60	2.18	2.52	1.68	2.48	3.15
12	11.70	3.67	6.56	4.25	5.42	3.88	2.40	2.12	2.31	1.64	2.41	3.80
13	17.28	4.47	6.10	4.19	4.98	3.70	1.96	2.68	2.12	1.64	2.38	4.62
14	19.35	6.70	5.64	4.09	4.38	3.66	1.81	2.15	1.94	1.71	2.29	4.28
15	11.45	12.77	5.20	4.07	3.98	3.79	1.80	1.88	1.85	1.81	2.68	4.32
16	9.05	19.04	4.95	4.18	3.62	6.86	1.68	1.72	1.78	1.66	3.10	3.82
17	7.47	19.65	4.84	4.32	3.30	5.02	1.44	1.55	1.71	1.59	2.68	3.42
18	6.57	11.13	4.75	3.97	3.55	4.75	1.39	1.52	1.62	1.50	2.68	3.15
19	6.03	8.85	4.87	4.02	4.14	4.38	1.36	1.36	1.54	1.40	2.51	2.98
20	5.39	8.67	5.49	4.15	4.92	3.30	1.31	1.72	1.46	1.42	2.78	2.88
21	5.03	7.63	5.99	3.98	8.18	3.18	1.31	1.70	1.44	1.40	3.82	2.78
22	4.67	6.67	6.13	3.83	9.36	3.96	1.35	1.39	1.42	1.41	3.80	2.75
23	4.47	6.13	5.83	3.63	8.03	3.25	1.69	1.34	1.46	1.42	3.48	2.90
24	4.11	5.27	6.05	3.55	8.48	3.68	2.78	1.26	1.46	1.75	3.12	2.94
25	3.95	4.96	5.80	3.37	7.26	3.38	2.74	1.38	1.39	3.72	2.92	3.30
26	3.75	6.23	5.57	3.45	6.35	2.92	2.58	13.84	1.39	6.14	2.78	3.48
27	4.53	8.17	5.29	3.42	5.46	2.55	3.98	9.84	1.38	4.35	2.72	3.92
28	4.40	6.54	4.72	3.61	5.02	2.42	5.08	7.04	2.34	3.78	2.50	4.51
29	4.30	6.10	4.63	3.97	5.16	2.28	3.66	5.48	4.93	5.12	2.38	4.96
30	4.53	.....	4.37	3.78	4.95	2.42	4.04	3.87	3.22	8.20	2.28	6.26
31	4.00	.....	4.49	.....	5.58	.....	3.25	3.18	.....	8.41	.....	7.61

COWPASTURE RIVER NEAR CLIFTON FORGE, VA.

The station was established May 13, 1907, in cooperation with the United States Forest Service, for the purpose of studying the run-off in the southern Appalachian region. It is located at the iron highway bridge crossing Cowpasture River 1½ miles above its junction with Jackson River, and about 4 miles southeast of Clifton Forge.

As the station was discontinued August 9, 1908, it was only maintained during one winter, but throughout that period there was little or no change in conditions of flow due to ice.

The gage datum remained unchanged during the period covered by the records. Conditions of flow are permanent and a good low-water rating has been developed.

Discharge measurements of Cowpasture River near Clifton Forge, Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 13	R. J. Taylor	158	346	2.00	671
June 27	R. G. Knight	157	317	1.89	608
July 18	do	155	250	1.39	317
July 25	do	152	209	1.21	210

Daily gage height, in feet, of Cowpasture River near Clifton Forge, Va., for 1907 and 1908.

[Observer, Florence Persinger.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						2.0	1.7	1.2	1.0	1.0	1.0	3.7
2						7.0	1.6	1.0	1.0	1.0	1.0	3.3
3						3.7	1.5	1.0	1.0	1.0	3.0	3.0
4						2.9	1.4	1.0	1.0	1.0	2.3	2.8
5						2.7	1.4	1.0	1.5	1.0	2.0	2.6
6						2.7	1.4	1.0	1.3	1.0	2.0	2.4
7						2.5	1.4	1.0	1.2	1.0	1.8	2.0
8						2.4	1.3	1.0	1.0	1.0	1.7	1.7
9						4.0	1.3	1.0	1.0	1.0	1.5	1.6
10						3.2	1.3	2.0	1.0	1.0	2.4	6.0
11						3.0	1.3	1.6	1.3	1.0	2.3	4.7
12						3.4	1.3	1.4	1.2	1.0	2.2	4.5
13					2.0	5.0	1.3	1.3	1.2	1.0	2.0	4.0
14					1.9	10.0	1.3	1.3	1.2	1.0	1.8	3.6
15					1.8	5.0	1.2	1.2	1.0	1.0	1.7	3.0
16					1.8	3.4	1.2	1.2	1.0	1.0	1.7	2.7
17					1.7	3.0	1.2	1.2	1.0	1.0	1.5	2.5
18					1.7	2.5	1.4	1.2	1.0	1.0	1.4	2.3
19					1.6	2.3	1.8	1.2	1.0	1.0	2.0	2.0
20					1.6	2.1	1.7	1.2	1.0	1.0	1.8	2.9
21					1.6	1.9	1.5	1.2	1.0	1.0	1.7	2.8
22					1.5	2.0	1.4	1.2	1.0	1.0	2.0	7.0
23					1.5	2.0	1.3	1.2	6.5	1.0	2.0	6.0
24					1.4	2.0	1.3	1.3	4.0	1.0	5.5	5.6
25					1.4	2.0	1.2	1.8	3.5	1.0	5.4	5.0
26					1.5	2.0	1.2	1.6	2.3	1.0	5.0	4.0
27					1.4	1.9	1.2	1.5	2.2	1.0	4.7	3.5
28					1.4	1.9	1.2	1.4	1.2	1.0	4.6	3.0
29					1.4	1.8	1.2	1.3	1.0	1.0	4.4	5.0
30					1.4	1.7	1.2	1.2	1.0	1.0	4.0	4.6
31					1.4		1.2	1.2		1.0		4.3
1908.												
1	4.0	1.0	2.0	6.3	2.0	2.1	1.3	1.5				
2	3.6	1.0	2.0	6.0	2.4	2.0	1.3	1.4				
3	3.3	1.0	4.0	5.4	2.2	2.0	1.3	1.4				
4	3.0	1.0	4.0	4.0	2.0	2.0	1.5	1.2				
5	2.6	1.0	3.7	3.5	2.0	2.0	1.6	1.1				
6	2.3	1.0	6.5	3.0	2.0	1.9	1.8	1.1				
7	2.2	1.0	5.5	2.8	5.0	1.9	1.8	1.1				
8	2.0	1.0	5.0	2.2	7.0	1.8	1.7	1.1				
9	1.8	1.0	4.6	1.5	4.0	1.9	1.5					
10	1.6	1.0	4.3	1.2	3.6	2.0	1.3					
11	1.5	1.0	4.0	1.0	3.4	2.0	1.3					
12	9.0	1.0	3.5	2.0	3.0	2.0	1.2					
13	7.0	1.0	3.0	2.0	2.4	2.0	1.2					
14	6.0	4.0	2.4	1.9	2.0	2.0	1.2					
15	4.0	4.0	2.0	1.6	2.0	2.2	1.1					
16	3.6	7.0	1.7	1.6	2.0	2.3	1.1					
17	3.3	5.3	1.4	1.4	3.3	2.2	1.1					
18	3.0	5.0	1.2	1.2	3.3	2.0	1.1					
19	2.6	4.5	2.3	1.0	3.2	2.0	1.1					
20	2.3	4.0	2.3	1.0	5.0	1.9	1.1					
21	2.0	3.4	2.2	1.0	3.6	1.8	1.1					
22	1.7	3.0	2.0	1.85	3.3	1.7	1.1					
23	1.4	3.0	2.0	1.8	4.0	1.5	1.1					
24	1.3	2.8	1.8	1.8	3.7	1.5	1.1					
25	1.0	2.6	1.6	1.8	3.0	1.5	1.1					
26	1.0	2.5	1.5	1.7	2.7	1.5	1.1					
27	1.0	2.5	1.3	1.7	2.5	1.5	1.1					
28	1.0	2.4	1.3	1.6	2.3	1.4	1.3					
29	1.0	2.3	1.2	1.6	2.1	1.4	2.3					
30	1.0		1.0	1.6	2.1	1.4	2.0					
31	1.0		5.5		2.1		1.8					

Daily discharge, in second-feet, of Cowpasture River near Clifton Forge, Va., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						674	472	221	148	148	148	
2							414	148	148	148	148	
3							360	148	148	148		
4							310	148	148	148	915	
5							310	148	360	148	674	
6							310	148	264	148	674	1,000
7						1,100	310	148	221	148	534	674
8						1,000	264	148	148	148	472	472
9							264	148	148	148	360	414
10							264	674	148	148	1,000	
11							264	414	264	148	915	
12							264	310	221	148	830	
13					674		264	264	221	148	674	
14					601		264	264	221	148	534	
15					534		221	221	148	148	472	
16					534		221	221	148	148	472	
17					472		221	221	148	148	360	1,100
18					472	1,100	310	221	148	148	310	915
19					414	915	534	221	148	148	674	674
20					414	750	472	221	148	148	534	
21					414	601	360	221	148	148	472	
22					360	674	310	221	148	148	674	
23					360	674	264	221		148	674	
24					310	674	264	264		148		
25					310	674	221	534		148		
26					360	674	221	414	915	148		
27					310	601	221	360	830	148		
28					310	601	221	310	221	148		
29					310	534	221	264	148	148		
30					310	472	221	221	148	148		
31					310		221	221		148		
1908.												
1		148	674		674	750	264	360				
2		148	674		1,000	674	264	310				
3		148			830	674	264	310				
4		148			674	674	360	221				
5		148			674	674	414	182				
6	915	148			674	601	534	182				
7	830	148				601	534	182				
8	674	148		830		534	472	182				
9	534	148		360		601	360					
10	414	148		221		674	264					
11	360	148		148		674	264					
12		148		674		674	221					
13		148		674	1,000	674	221					
14			1,000	601	674	674	221					
15			674	414	674	830	182					
16			472	414	674	915	182					
17			310	310		830	182					
18			221	221		674	182					
19			915	148		674	182					
20	915		915	148		601	182					
21	674		830	148		534	182					
22	472		674	568		472	182					
23	310		674	534		360	182					
24	264		534	534		360	182					
25	148		414	534		360	182					
26	148	1,100	360	472		360	182					
27	148	1,100	264	472	1,100	360	182					
28	148	1,000	264	414	915	310	264					
29	148	915	221	414	750	310	915					
30	148		148	414	750	310	674					
31	148				750		534					

NOTE.—Daily discharges for 1907 and 1908 are based on a well-defined rating curve. The discharge was greater than 1,200 second-feet for all missing days from May 13, 1907, to August 8, 1908.

ROANOKE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Roanoke River is formed by the North and South forks, which rise among the eastern foothills of the Appalachian Mountains and unite near Lafayette, at the eastern edge of Montgomery County. From this junction the river flows in a general southeasterly direction and empties into Albemarle Sound in North Carolina. The total drainage area is about 9,200 square miles. The section of river extending from a short distance below Roanoke to the junction of the Dan is known locally as Staunton River and was so called in the reports of the United States Geological Survey prior to 1905.

The principal tributary is Dan River, which rises in Surry County, N. C., and Patrick County, Va., and empties into the Roanoke near Clarksville, in the southwestern part of Mecklenberg County, Va. This is by far the largest tributary, the remaining streams being relatively small and unimportant.

The drainage basin of the Roanoke is divided into two nearly equal parts by the fall line, which crosses the river between Weldon and Gaston. The eastern part, which is known geologically as the Coastal Plain, is built up of unconsolidated sands, gravels, loams, clays, and marls of recent geologic age. It is low and flat and so poorly drained that a large percentage of the area is swampy. The general slope of this section of the basin is from 1 to 3 feet per mile. The river is sluggish and is navigable by light-draft boats at all seasons as far west as Weldon. Above the fall line (in the region known as the Piedmont Plateau) the country is more broken and the river has more fall, having cut its bed down to the underlying metamorphic rocks. Building stones are found in abundance in different sections. Along the river are many fine bottoms which contain some of the best farming lands in the vicinity. The surface is undulating, and the hills rise higher and higher toward the western margin. The range of altitude within the entire basin is 3,000 feet.

The Coastal Plain section of the drainage basin is quite heavily timbered, and large quantities of timber and shingles are shipped. In the Piedmont Plateau area the percentage of forest covering has not been ascertained except for the portion drained by the Dan, in which there are extensive timbered areas.

The mean annual rainfall for the drainage basin within the Piedmont Plateau ranges from 38 to 47 inches in different parts of the area, as determined from six Weather Bureau stations having records of five to sixteen years in length. In the Coastal Plain section the rainfall is somewhat greater, increasing as the coast line is approached.

The drainage basin of Roanoke River has such a southern latitude that there is relatively little effect on the flow of the stream from ice conditions.

There are no lakes within the Roanoke drainage basin, but owing to the hilly character of the upper basin it is probable that sites for reservoirs of moderate capacity exist. Especially is this true for the portion of the basin drained by Dan River. Here the river bed is solid rock overlaid with sands and gravel between the rapids, affording excellent facilities for dams.

In 1905 a survey of Roanoke River was made by the United States Geological Survey from Roanoke, Va., to Weldon, N. C. This survey showed that the fall between the two points was 976 feet in a distance of 231 miles, or an average of 4.2 feet per mile. The following is an extract from the report of that survey,[a] which was prepared by the cooperation of the State and United States geological surveys:

In most cases where there is a power site there is suitable rock for masonry and the bed of the river is suitable for foundations.

The river is divided naturally into six sections:

	Miles.
1. Weldon to Clarksville	70
2. Clarksville to Randolph	25
3. Randolph to Brookneal	32
4. Brookneal to Hurt	30
5. Hurt to Pig River	24
6. Pig River to Roanoke	50

Section 1, Weldon to Clarksville.—This section is 70 miles long; total fall from Clarksville is about 250 feet; average about 36 feet to the mile. The river varies in width from 600 feet to 1,300 feet; banks are low; the valley is from one-half to 1 mile wide; bottom, bowlders and rock. There are many sites favorable for dams and mills. The total fall in the old canal at Weldon is about 90 feet in a distance of 8½ miles. At Eatons Falls, about 14 miles above Weldon, there is a fall of 12 feet in 3,300 feet. From Clarksville to Taylors Ferry, a distance of 13 miles, there is a total fall of 55 feet. The Dan River joins the Roanoke at Clarksville.

Section 2, Clarksville to Randolph.—This stretch is 25 miles long; fall from Richmond is about 49 feet; average about 2 feet per mile. The width varies from 300 to 600 feet; banks low; bottom of river, bowlders and rock; valley one-half to 1 mile wide. The only large falls in this stretch is Tallys Falls near Abbyville, about 8 miles above Clarksville. The total fall is some 18 feet in a distance of 2½ miles; the remainder of the river is of comparatively uniform slope with an occasional fall of a foot or two.

Section 3, Randolph to Brookneal.—The length of this section is about 32 miles; total fall from Brookneal is 48 feet; average per mile 1.5; width about 400 feet; banks high; bottom, bowlders and rock. There are no falls or ripples of any extent on this stretch.

Section 4, Brookneal to Hurt.—Length 30 miles; total fall from Hurt is 151 feet; average per mile, 5 feet; banks of medium height; valley one-fourth to one-half mile wide; bottom, bowlders and rock. Just above Brookneal there is a fall of 18 feet in 1¾ miles. From Green Hill Ferry to Brookneal, a distance of 8 miles, there is a fall of 64 feet.

Section 5, Hurt to Pig River.—Length, 24 miles; fall from Pig River, 72 feet; average per mile, 3 feet; width, about 200 feet; banks low; bottom, bowlders and rock. There are no falls of any magnitude in this section.

[a] Hydrography of Virginia: Bull. Geol. Survey Virginia No. 3, pp. 166-167.

Section 6, Pig River to Roanoke.—Length, 52 miles; fall from Roanoke, 406 feet; average about 8 per mile; width, about 150 feet; banks low; bottom, bowlders and rock; valley narrow.

There are several power sites along this stretch, probably the best being at Smith Mountain Gap, where there is a narrow gorge between vertical walls of rock. A dam at this point, 75 feet high, would develop approximately 2,000 horsepower at low water, this estimate being calculated from the discharge at Roanoke City, where there is a gaging station, assuming that the discharge at Smith Mountain is directly proportional to the drainage areas.[a]

Underground water in small amounts can probably be obtained almost anywhere within the Piedmont Plateau. The waters of the springs of this region contain large amounts of mineral matter and are extensively used for medicinal purposes. Few deep wells have been sunk, but it is probable that moderate amounts of water would be obtained in a considerable percentage of the wells drilled.

The United States Geological Survey has maintained records of flow in this basin since 1896 and the records compiled since that date show the year of greatest run-off to be 1901 and that of least run-off 1904. The total flow in the latter year was less than half that of the former. The region is subject to heavy rainstorms which produce floods that rise very rapidly and subside as quickly. The flood of 1877 is the highest known flood along the river. Below is a table of the heights above low water at various places:

Table of 1877 flood heights along Roanoke River.

	Distance above Weldon in miles.	Height above low water in feet.
South Gaston	14	18
Eatons Ferry	24	18
Boyd's Mill	36	34
St. Tammanys Ferry	40	33
Goodes Ferry	44	33
Taylors Ferry	57	34
Fields Ferry	63	23
Clarksville	70	24
Randolph	95	36
Coles Ferry	116	43
Dearwood Ford	182	32
Above Smith Mountain Gap	190	25
Lynville Ford	210	37
Backwater Ford	221	28

The flood of 1889 was about 5 feet below the 1877 flood at Taylor's Ferry.

[a] The map of the Roanoke River survey was originally issued in 11 sheets having a horizontal scale of 1 inch = 2,000 feet, and a vertical scale of 1 inch = 8 feet. A few sets of this map are available for distribution and may be obtained from the United States Geological Survey.

The following gaging stations have been maintained in the Roanoke basin by the United States Geological Survey:[a]

Roanoke at Roanoke, Va. (1896–1908).
Roanoke at Randolph, Va. (1900–1906).
Roanoke above the Dan at Clarksville, Va. (1895–1898).
Roanoke at Neal, N. C. (1896–1903).
Tinker Creek at Roanoke, Va. (1907–8).
Back Creek near Roanoke, Va. (1907–8).
Dan at Madison, N. C. (1903–1908).
Dan at South Boston, Va. (1900–1907).
Dan at Clarksville, Va. (1895–1898).
Banister at Houston, Va. (1904–5).

ROANOKE RIVER AT ROANOKE, VA.

The station was established July 10, 1896, at the Walnut Street Bridge in Roanoke, in order to study the run-off of the stream for possible water power and comparative purposes. Gage heights were discontinued July 14, 1906, but were recommenced May 7, 1908, and are now being furnished to the United States Geological Survey through the courtesy of the Roanoke Railway and Electric Company.

The nearest tributary of any size is Tinker Creek, which enters Roanoke River about 3 miles below the gaging section. The overflow from Crystal Spring, which is approximately 2 second-feet, enters Roanoke River between Walnut Street Bridge, where the gage is located, and Jefferson Street Bridge, one-third mile above, where discharge measurements are usually made. Crystal Spring is the source of water supply for the city of Roanoke.

Since the establishment of the gage in 1896 the records tend to indicate that the discharge is not materially affected by ice conditions.

The datum of the gage, which is of the chain type, has remained the same since the establishment of the station. Owing to changing conditions of flow frequent measurements are required at low stages to adequately define the true discharge curve from year to year.[b]

Discharge measurements of Roanoke River at Roanoke Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 7	R. J. Taylor	124	486	2.65	1,330
June 22	R. G. Knight	110	315	1.48	430
July 20	do	110	252	1.12	319
July 24	do	108	195	.88	187

[a] All records and discharge data collected in Roanoke River basin prior to 1906 have been revised by engineers of the United States Geological Survey and republished in Hydrography of Virginia, Bull. Geol. Survey Virginia, No. 3, 1906, pp. 163–213.

All records of discharge in the Roanoke basin prior to 1908, except Roanoke River at Roanoke, Tinker Creek at Roanoke, Back Creek near Roanoke, and Banister River at Houston have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

[b] Descriptive matter and discharge data collected prior to 1906 have been revised by engineers of the United States Geological Survey and republished in Hydrography of Virginia, Bull. Geol. Survey Virginia No. 3, 1906, pp. 167–182.

Daily gage height, in feet, of Roanoke River at Roanoke, Va., for 1907 and 1908.

[Observer, C. C. Hogshead.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	1.85	1.65	0.85	0.8	0.95	0.8	1.4
2	.....	.....	.....	.....	.....	2.65	1.4	.85	.8	.95	.9	1.3
3	.....	.....	.....	.....	.....	2.4	1.3	.85	.8	.9	.9	1.2
4	.....	.....	.....	.....	.....	2.1	1.25	.85	.85	.85	.9	1.1
5	.....	.....	.....	.....	.....	1.9	1.1	.85	.8	.85	.9	1.1
6	.....	.....	.....	.....	.....	1.85	1.2	.9	.75	.85	.9	1.1
7	.....	.....	.....	.....	2.65	1.75	1.15	.9	.7	.85	.8	1.1
8	.....	.....	.....	.....	2.4	1.6	1.05	.9	.7	.8	.8	1.05
9	.....	.....	.....	.....	2.2	1.5	1.0	.9	.7	.8	.8	1.05
10	.....	.....	.....	.....	2.0	1.5	.9	.9	.75	.8	.8	1.05
11	.....	.....	.....	.....	1.9	1.45	1.0	.9	.75	.8	.8	1.05
12	.....	.....	.....	.....	1.75	2.3	1.0	.9	.8	.8	.8	1.05
13	.....	.....	.....	.....	1.7	4.3	1.0	.9	.8	.8	.8	1.05
14	.....	.....	.....	.....	1.65	3.1	1.0	.9	.8	.8	.95	1.05
15	.....	.....	.....	.....	1.6	2.4	.9	.9	.8	.8	.9	1.8
16	.....	.....	.....	.....	1.5	2.1	1.0	.9	.8	.8	.8	1.9
17	.....	.....	.....	.....	1.45	2.0	1.0	.9	.8	.8	.8	1.8
18	.....	.....	.....	.....	1.4	1.85	1.0	.85	.8	.8	.8	1.75
19	.....	.....	.....	.....	1.3	1.75	1.0	.85	.9	.8	.8	1.7
20	.....	.....	.....	.....	1.3	1.55	.95	.8	1.05	.8	.9	1.6
21	.....	.....	.....	.....	1.3	1.5	.95	.8	.85	.8	.9	1.6
22	.....	.....	.....	.....	1.25	1.45	.9	.8	.9	.8	.9	1.8
23	.....	.....	.....	.....	1.2	1.4	.9	1.0	6.7	.8	1.4	2.5
24	.....	.....	.....	.....	1.2	1.4	.9	1.05	2.3	.8	2.7	2.6
25	.....	.....	.....	.....	1.2	2.0	.9	.95	1.9	.8	2.4	2.5
26	.....	.....	.....	.....	1.2	1 55	.9	.9	1.8	.8	2.5	2.05
27	.....	.....	.....	.....	1.2	1.5	.9	.9	1.45	.8	2.4	2.3
28	.....	.....	.....	.....	1.2	1.45	.9	.8	1.3	.9	2.3	2.4
29	.....	.....	.....	.....	1.05	1.4	.9	.8	1.2	.9	2.1	2.6
30	.....	.....	.....	.....	1.05	1.7	.85	.8	1.1	.9	1.8	2.8
31	.....	.....	.....	.....	1.05	.....	.85	.8	.....	.9	.....	2.95
1908.												
1	2.90	0.90	1.70	1.80	1.65	1.25	1.30	.95	1.00	.90	2.10	1.30
2	2.80	.90	1.70	1.80	1.48	1.15	1.20	.87	.97	.82	1.80	1.28
3	2.75	.90	1.75	1.60	1.40	1.12	1.18	.82	.93	.80	1.75	1.20
4	2.75	1.00	1.75	3.50	1.48	1.55	2.50	.85	.90	.80	1.65	1.15
5	2.60	1.05	1.60	2.15	1.37	2.65	1.95	.83	.90	.80	1.55	1.15
6	2.60	1.35	1.65	1.90	1.40	2.05	3.00	.90	3.00	.80	1.48	1.20
7	2.55	1.50	1.65	1.80	1.70	1.80	2.05	.87	1.85	.75	1.40	1.45
8	2.55	1.60	1.60	1.80	2.40	1.65	1.70	.87	1.90	.78	1.40	2.00
9	2.50	1.50	1.60	1.60	2.20	1.50	1.40	.92	1.40	.75	1.35	1.80
10	2.50	1.55	1.50	1.60	1.83	1.50	1.35	1.00	1.30	1.20	1.30	1.65
11	2.90	1.50	1.55	1.60	1.62	1.45	1.30	.90	1.20	2.00	1.35	1.50
12	8.80	1.60	1.50	1.50	1.53	2.95	1.18	.90	1.10	1.50	1.30	1.85
13	3.10	1.60	1.55	1.55	1.47	1.75	1.15	.85	1.05	1.25	1.30	1.95
14	2.90	1.70	1.55	1.50	1.35	1.65	1.10	.78	1.05	1.15	1.25	1.85
15	2.80	1.60	1.50	1.40	1.20	1.55	1.05	.80	1.00	1.10	1.30	1.70
16	2.75	1.60	1.60	1.50	1.35	1.45	1.00	.90	.95	1.00	1.30	1.60
17	2.60	1.70	1.65	1.55	1.28	1.30	1.00	1.05	.93	.98	1.35	1.50
18	2.50	1.60	1.65	1.40	1.23	1.25	.98	.95	.92	.98	1.55	1.48
19	2.35	1.75	1.70	1.40	1.60	1.18	.95	.93	.90	.95	2.50	1.45
20	2.05	1.70	1.60	1.40	1.65	1.16	.97	.85	.90	.90	2.20	1.40
21	1.75	1.80	1.70	1.20	1.85	1.25	.95	.82	.90	.90	2.00	1.35
22	1.75	1.85	1.70	1.30	2.00	1.30	1.00	.80	.90	.92	1.75	1.35
23	1.70	1.90	1.80	1.20	2.05	1.30	.98	1.05	.89	.97	1.65	1.45
24	1.60	1.80	1.80	1.10	1.90	1.23	1.65	.90	.87	6.70	1.55	1.45
25	1.50	1.70	1.70	1.30	1.73	1.17	1.10	1.05	.85	2.80	1.50	1.70
26	1.30	1.80	1.75	1.30	1.60	1.10	1.00	2.45	.85	2.20	1.48	2.70
27	1.20	1.70	1.70	1.30	1.50	1.15	1.00	1.55	.84	1.85	1.45	2.40
28	1.05	1.70	1.70	1.55	1.40	1.05	1.40	1.32	1.00	1.70	1.40	2.10
29	1.05	1.70	1.70	1.45	1.40	1.00	1.15	1.25	1.00	3.45	1.35	2.55
30	1.00	.....	1.70	.....	1.40	.98	1.10	1.15	.95	3.30	1.30	3.65
31	.90	.....	1.80	.....	1.30	.....	1.00	1.05	.....	2.55	.....	3.20

Rating tables for Roanoke River at Roanoke, Va.

FOR 1907.[a]

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	132	2.20	920	3.70	2,515
.80	162	2.30	1,000	3.80	2,645
.90	195	2.40	1,090	3.90	2,775
1.00	231	2.50	1,180	4.00	2,905
1.10	271	2.60	1,270	4.20	3,175
1.20	313	2.70	1,370	4.40	3,445
1.30	357	2.80	1,470	4.60	3,715
1.40	404	2.90	1,570	4.80	3,985
1.50	455	3.00	1,680	5.00	4,255
1.60	510	3.10	1,790	5.20	4,525
1.70	568	3.20	1,900	5.40	4,795
1.80	630	3.30	2,020	5.60	5,065
1.90	700	3.40	2,140	5.80	5,335
2.00	770	3.50	2,265	6.00	5,605
2.10	840	3.60	2,390	7.00	6,955

FOR 1905, 1906, AND 1908.[b]

0.70	96	2.40	1,050	4.20	3,175
.80	122	2.50	1,140	4.40	3,445
.90	152	2.60	1,240	4.60	3,715
1.00	186	2.70	1,340	4.80	3,985
1.10	224	2.80	1,440	5.00	4,255
1.20	264	2.90	1,550	5.20	4,525
1.30	310	3.00	1,660	5.40	4,795
1.40	360	3.10	1,780	5.60	5,065
1.50	415	3.20	1,900	5.80	5,335
1.60	470	3.30	2,020	6.00	5,605
1.70	530	3.40	2,140	6.20	5,875
1.80	590	3.50	2,265	6.40	6,145
1.90	655	3.60	2,390	6.60	6,415
2.00	725	3.70	2,515	6.80	6,685
2.10	800	3.80	2,645	7.00	6,955
2.20	880	3.90	2,775	8.00	8,305
2.30	960	4.00	2,905	9.00	9,655

Monthly discharge of Roanoke River at Roanoke, Va., for 1907 and 1908.

[Drainage area, 388 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 7-13	1,320	251	494	1.27	1.18	B.
June	3,310	404	768	1.98	2.21	B.
July	539	178	244	.629	.73	B.
August	251	162	187	.482	.56	B.
September	6,550	132	462	1.19	1.33	B.
October	213	162	173	.446	.51	B.
November	1,370	162	384	.990	1.10	B.
December	1,620	251	632	1.63	1.88	B.
1908.[c]						
January	9,380	152	1,230	3.17	3.66	B.
February	655	152	448	1.15	1.24	B.
March	590	415	506	1.30	1.50	B.
April	2,260	224	494	1.27	1.42	B.
May	1,050	264	478	1.23	1.42	B.
June	1,600	179	421	1.09	1.22	B.
July	1,660	169	358	.923	1.06	C.
August	1,100	117	207	.534	.62	C.
September	1,660	134	262	.675	.75	C.
October	6,550	109	647	1.67	1.92	B.
November	1,140	287	459	1.18	1.32	B.
December	2,450	244	627	1.62	1.87	B.
The year	9,380	109	511	1.32	18.00	

[a] This table is not applicable for ice or obstructed-channel conditions. It is based on four discharge measurements made in 1907 and on high-water measurements made in earlier years. It is well defined between gage heights 0.8 foot and 8 feet.

[b] This table is not applicable for ice or obstructed-channel conditions. It is considered to be the best table to use for normal low-water conditions when no discharge measurements are available, as was the case in 1908.

[c] No discharge measurements were made during 1908; hence the accuracy of the above results is somewhat doubtful at low stages. See rating-table footnote.

ROANOKE[a] RIVER AT RANDOLPH, VA.

This station was established August 27, 1900, and was discontinued August 12, 1906. It is located on the railway bridge about five-eighths of a mile southwest of the Southern Railway station at Randolph.

Little Roanoke River enters Roanoke River from the left about 1 mile below the gaging station. It is a relatively small stream and does not affect the conditions of flow at the station. Dan River enters the Roanoke about 25 miles below Randolph. The discharge is sometimes slightly affected by ice conditions during severe winters.

The datum of the chain gage has remained the same since October 13, 1902. Prior to that date the datum was about 2 feet lower than at present. During the summer of 1902 the bridge to which the gage was attached was replaced by a new one, a temporary gage set by the observer being used during the construction work. Gage height records for that time are approximate.

Conditions of flow at and below the station are liable to change with every flood. During flood stages the river flows under the four-spanned bridge and also through two flood channels through the railroad embankment between the bridge and Randolph station. The velocity of flow through these flood channels is greater than the mean velocity of flow in the main channel. This flood flow forms a well-defined channel below the railroad embankment and enters the river several hundred feet below the station.[b]

The following discharge measurement was made February 22, 1907, by Warren E. Hall:

Width, 250 feet; area, 1,040 square feet; gage height, 5.10 feet; discharge, 2,190 second-feet.

No monthly discharges were published for this station for 1906 because it was expected that more definite data regarding the proper location of the rating curve could be obtained. Owing to limited appropriation, however, this will be impossible for some years; hence, the following rating and monthly discharge tables for 1906 are given:

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[a] Called Staunton River in reports prior to 1905.

[b] All records and discharge data for this station for years prior to 1906 have been revised by engineers of the United States Geological Survey and republished in Hydrography of Virginia, Bull. Geol. Survey Virginia No. 3, 1906, pp. 182–193. Complete records of discharge during the maintenance of the station have also been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Rating table for Roanoke River at Randolph, Va., for 1906.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.90	1,300	5.50	2,530	7.20	4,100	12.00	9,460
4.00	1,370	5.60	2,615	7.40	4,300	13.00	10,660
4.10	1,440	5.70	2,700	7.60	4,500	14.00	11,900
4.20	1,510	5.80	2,785	7.80	4,700	15.00	13,200
4.30	1,580	5.90	2,870	8.00	4,900	16.00	14,630
4.40	1,655	6.00	2,960	8.20	5,110	17.00	16,320
4.50	1,730	6.10	3,050	8.40	5,320	18.00	18,590
4.60	1,805	6.20	3,140	8.60	5,530	19.00	21,220
4.70	1,880	6.30	3,230	8.80	5,750	20.00	24,150
4.80	1,960	6.40	3,320	9.00	5,970	21.00	27,150
4.90	2,040	6.50	3,415	9.20	6,190	22.00	30,200
5.00	2,120	6.60	3,510	9.40	6,410	23.00	33,300
5.10	2,200	6.70	3,605	9.60	6,630	24.00	36,600
5.20	2,280	6.80	3,700	9.80	6,850		
5.30	2,360	6.90	3,800	10.00	7,080		
5.40	2,445	7.00	3,900	11.00	8,260		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1905–1907 and the form of earlier rating curves. It is fairly well defined.

Monthly discharge of Roanoke River at Randolph, Va., for 1906.

[Drainage area, 3,080 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	35,200	2,440	6,200	2.01	2.32	B.
February	8,860	2,000	3,220	1.05	1.09	B.
March	14,000	2,620	4,210	1.37	1.58	B.
April	6,910	2,120	3,980	1.29	1.44	B.
May	5,860	1,300	2,300	.747	.86	B.
June	6,360	2,080	2,880	.935	1.04	B.
July	4,650	1,540	2,360	.766	.88	B.
August 1–11	5,420	3,320	4,020	1.31	.54	B.

TINKER CREEK AT ROANOKE, VA.

The station was established May 7, 1907, at the Lynchburg Avenue Bridge crossing Tinker Creek, on the outskirts of Roanoke. It was established in cooperation with the United States Forest Service for the purpose of studying the run-off from the southern Appalachian region, and was discontinued July 31, 1908.

The nearest important tributary is Glade Creek, which enters Tinker Creek 1 mile below the bridge.

Just below the bridge is a low temporary dam of loose rock extending part way across the channel, which is the controlling point at medium stages. At very low stages there is a small rapid between the bridge and the dam.

There was no effect from ice during the period of maintenance of the station.

During the period covered by the records the gage datum remained unchanged. Conditions of flow are probably permanent, and a good low-water rating has been developed.

Discharge measurements of Tinker Creek at Roanoke, Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 7	R. J. Taylor	93	176	1.23	168
June 22	R. G. Knight	80	117	.86	90
July 20	do	91	110	.69	56
July 23	do	90	108	.63	39

Daily gage height, in feet, of Tinker Creek at Roanoke, Va., for 1907 and 1908.

[Observer, R. P. Vandergrift.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.							1907.						
1		0.55	0.5	0.6	0.5	0.85	17	0.7	0.5	0.5	0.7	0.6	1.2
2		.55	.5	.6	.9	.8	18	.7	.5	.55	.7	.85	1.05
3		.5	.5	.6	.85	.8	19	.7	.5	.55	.7	1.0	1.0
4		.5	.5	.6	.65	.8	20	.7	.5	.5	.65	.9	1.0
5		.4	.5	.6	.65	.75	21	.7	.5	.5	.6	.9	1.0
6		.4	.5	.6	.65	.75	22	.7	.55	.6	.6	.9	.9
7		.4	.65	.7	.6	.75	23	.6	.6	5.0	.6	1.75	1.9
8		.4	.5	.65	.6	.7	24	.6	.6	1.5	.55	2.0	1.5
9		.45	.55	.6	.6	.7	25	.6	.6	.85	.55	1.0	1.2
10		.75	.4	.6	.6	1.05	26	.5	.5	.9	.55	1.0	1.0
11		.6	.65	.65	.6	1.0	27	.5	.5	.95	.55	.9	1.0
12		.6	.65	.6	.55	.9	28	.6	.4	.95	.55	.9	1.0
13		.65	.65	.55	.6	.9	29	.7	.4	.85	.55	.9	1.0
14		.5	.7	.6	.6	1.5	30	.6	.4	.75	.55	.9	1.25
15		.5	.7	.6	.6	1.65	31	.5	.5		.6		1.05
16	0.7	.5	.6	.6	.6	1.65							

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	1.15	0.75	1.05	1.55	0.8	0.8	0.8					
2	1.05	.75	1.05	1.55	.8	.85	1.05					
3	1.05	.95	1.05	1.4	.8	.9	.85					
4	1.05	.95	1.05	1.25	.8	1.35	1.7					
5	1.05	.95	1.05	1.05	.8	1.1	1.35					
6	1.05	.95	1.3	1.05	.8	1.0	1.55					
7	2.05	.95	1.2	1.05	1.4	1.0	1.4					
8	2.05	.95	1.05	.95	1.25	.9	1.05					
9	1.25	.95	1.05	.95	1.1	1.55	1.0					
10	1.1	.95	1.05	.95	.9	1.1	1.0					
11	1.05	.95	1.05	.95	.9	1.1	1.0					
12	4.05	1.1	1.05	.85	.9	1.0	1.0					
13	2.0	1.65	1.05	.85	.9	1.0	1.0					
14	1.55	1.85	1.05	.85	.9	1.0	.9					
15	1.25	2.5	.95	.85	.9	1.0	.9					
16	1.05	1.55	.95	.85	.8	1.0	.6					
17	1.05	1.35	.95	.85	.8	.9	.8					
18	1.05	1.15	.95	.85	.8	.9	.8					
19	1.05	1.15	.95	.85	.8	.9	.8					
20	1.05	1.15	.85	.85	.8	.9	.8					
21	1.05	1.05	.85	.85	.9	.9	.8					
22	1.05	1.05	.85	.85	.9	.9	.8					
23	.95	1.05	.95	.85	1.0	.9	.8					
24	.95	1.05	1.15	.8	1.0	.9	1.0					
25	.95	1.05	1.1	.75	.8	.8	1.0					
26	.85	1.05	1.05	.75	.8	.8	1.0					
27	.85	1.05	1.05	.78	.8	.8	1.45					
28	.85	1.05	.95	.8	.8	.8	1.15					
29	.85	1.05	.95	.8	.8	.8	1.0					
30	.85		.95	.75	.8	.8	1.0					
31	8		1.05		.8		1.0					

NOTE.—Gage heights prior to July 16, 1907, are not published owing to large errors in the recorded readings.

Daily discharge, in second-feet, of Tinker Creek at Roanoke, Va., for 1907 and 1908.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.							1907.						
1	.....	31	24	38	24	84	17	55	24	24	55	38	161
2	.....	31	24	38	95	74	18	55	24	31	55	84	126
3	.....	24	24	38	84	74	19	55	24	31	55	115	115
4	.....	24	24	38	46	74	20	55	24	24	46	95	115
5	.....	13	24	38	46	64	21	55	24	24	38	95	115
6	.....	13	24	38	46	64	22	55	31	38	38	95	95
7	.....	13	46	55	38	64	23	38	38	1,970	38	322	375
8	.....	13	24	46	38	55	24	38	38	245	31	410	245
9	.....	18	31	38	38	55	25	38	38	84	31	115	161
10	.....	64	13	38	38	126	26	24	24	95	31	115	115
11	.....	38	46	46	38	115	27	24	24	105	31	95	115
12	.....	38	46	38	31	95	28	38	13	105	31	95	115
13	.....	46	46	31	38	95	29	55	13	84	31	95	115
14	.....	24	55	38	38	245	30	38	13	64	31	95	174
15	.....	24	55	38	38	290	31	24	24	.....	38	.....	120
16	55	24	38	38	38	290							

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1908.								1908.							
1	147	64	126	.....	74	74	74	17	126	201	105	84	74	95	74
2	126	64	126	.....	74	84	126	18	126	149	105	84	74	95	74
3	126	105	126	215	74	95	84	19	126	149	105	84	74	95	74
4	126	105	126	174	74	201	.....	20	126	149	84	84	74	95	74
5	126	105	126	126	74	137	201	21	126	126	84	84	95	95	74
6	126	105	187	126	74	115	.....	22	126	126	84	84	95	95	74
7	.....	105	161	126	215	115	215	23	105	126	105	84	115	95	74
8	.....	105	126	105	174	95	126	24	105	126	147	74	115	95	115
9	174	105	126	105	137	.....	115	25	105	126	137	64	74	74	115
10	137	105	126	105	95	137	115	26	84	126	126	64	74	74	115
11	126	105	126	105	95	137	115	27	84	126	126	70	74	74	230
12	.....	137	126	84	95	115	115	28	84	126	105	74	74	74	149
13	.....	.....	126	84	95	115	115	29	84	126	105	74	74	74	115
14	.....	.....	126	84	95	115	95	30	84	.....	105	64	74	74	115
15	174	.....	105	84	95	115	95	31	74	.....	126	.....	74	.....	115
16	126	.....	105	84	74	115	38								

NOTE.—Daily discharges for 1907 and 1908 are based on a well-defined rating curve. The discharge was greater than 250 second-feet for all missing days from July 16, 1907, to July 31, 1908.

BACK CREEK NEAR ROANOKE, VA.

The station was established May 8, 1907, at a footbridge one-half mile below the settlement of Red Hill and 7 miles south of Roanoke, in cooperation with the United States Forest Service for the purpose of studying the run-off from the southern Appalachian region. It was discontinued July 31, 1908.

The nearest tributary is Narrow Creek, which joins Back Creek a short distance below the station.

There was no effect from ice during the period of maintenance of the station. During the period covered by the records, the datum of the vertical staff gage, which is located 200 feet above the footbridge, remained unchanged. Conditions of flow at this station appear to be permanent and a fairly good low-water rating has been developed.

Discharge measurements of Back Creek near Roanoke, Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 8	R. J. Taylor	45	52	1.50	97
June 21	R. G. Knight	39	44	1.36	64
July 20	do	40	32	1.16	34
July 23	do	39	26	1.08	25

Daily gage height, in feet, of Back Creek near Roanoke, Va., for 1907 and 1908.

[Observer, W. P. Turner.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						4.4	1.3	1.0	0.9	1.4	1.4	1.5
2						2.5	1.3	1.0	.9	1.5	1.7	1.5
3						2.1	1.3	1.0	1.1	1.5	1.5	1.5
4						1.7	1.2	1.0	1.2	1.5	1.4	1.5
5						1.7	1.2	1.0	1.1	1.5	1.4	1.5
6						1.6	1.2	1.15	1.0	1.5	1.4	1.5
7						1.5	1.2	1.1	1.0	1.5	1.4	1.5
8					1.5	1.6	1.1	1.0	1.0	1.5	1.4	1.5
9					1.5	1.5	1.1	1.0	1.0	1.5	1.4	1.6
10					1.4	1.4	1.3	1.0	1.0	1.5	1.5	1.8
11					1.4	1.6	1.2	1.4	1.4	1.5	1.5	1.7
12					1.3	1.5	1.2	1.3	1.1	1.4	1.5	1.6
13					1.3	3.1	1.2	1.5	1.0	1.4	1.5	1.5
14					1.2	2.5	1.2	1.2	1.0	1.4	1.4	1.6
15					1.2	2.0	1.3	1.1	1.0	1.4	1.4	1.8
16					1.2	1.8	1.2	1.1	.9	1.4	1.4	1.9
17					1.2	1.6	1.4	1.1	.9	1.4	1.4	1.8
18					1.2	1.5	1.2	1.0	.9	1.4	1.9	1.7
19					1.1	1.4	1.2	1.0	.9	1.4	1.6	1.6
20					1.1	1.4	1.2	1.0	.9	1.4	1.5	1.6
21					1.1	1.35	1.1	1.0	1.0	1.4	1.7	1.6
22					1.1	1.3	1.1	1.5	1.2	1.4	1.6	1.6
23					1.1	1.3	1.1	1.2	6.9	1.4	1.7	3.85
24					1.1	1.3	1.1	1.1	2.5	1.4	2.5	2.5
25					1.2	1.7	1.0	1.0	1.9	1.4	2.0	2.2
26					1.1	1.5	1.0	1.0	1.6	1.4	1.8	1.8
27					1.1	1.4	1.0	1.0	1.5	1.5	1.6	1.7
28					1.1	1.3	1.0	1.0	1.5	1.5	1.6	1.6
29					1.1	1.7	1.1	1.0	1.5	1.4	1.5	1.7
30					1.1	1.4	1.1	1.0	1.4	1.4	1.5	2.2
31					1.2	.....	1.0	1.0	.....	1.4	.....	1.8

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1908.								1908.							
1	1.7	1.5	1.6	2.0	1.2	1.1	1.3	17	1.9	2.0	1.4	1.3	1.2	1.3	1.0
2	1.7	1.7	1.5	1.9	1.2	1.0	1.3	18	1.9	1.9	1.4	1.3	1.2	1.2	1.0
3	1.7	1.7	1.5	1.7	1.2	1.1	1.5	19	1.8	1.9	1.4	1.2	1.3	1.2	1.0
4	1.7	1.7	1.5	1.6	1.2	2.5	1.3	20	1.8	1.7	1.5	1.2	1.4	1.2	1.0
5	1.7	1.6	1.7	1.5	1.1	1.5	1.8	21	1.8	1.7	1.5	1.2	1.4	1.2	1.0
6	1.7	1.6	1.7	1.5	1.1	1.4	1.6	22	1.7	1.7	1.5	1.2	1.4	1.2	1.0
7	3.3	1.7	1.7	1.5	1.9	1.3	1.5	23	1.7	1.7	1.6	1.2	1.4	1.2	1.3
8	2.2	1.7	1.6	1.5	1.5	1.3	1.5	24	1.7	1.6	1.5	1.2	1.3	1.1	1.2
9	2.0	1.7	1.6	1.4	1.4	1.9	1.4	25	1.7	1.6	1.5	1.3	1.3	1.1	1.1
10	1.9	1.7	1.6	1.4	1.3	1.4	1.3	26	1.7	1.8	1.5	1.3	1.2	1.35	1.6
11	1.7	1.6	1.5	1.4	1.2	1.3	1.3	27	1.7	1.7	1.4	1.2	1.2	1.2	1.3
12	4.5	2.0	1.6	1.4	1.2	1.8	1.2	28	1.6	1.6	1.4	1.1	1.2	1.1	1.2
13	3.0	2.4	1.5	1.3	1.2	1.5	1.2	29	1.5	1.6	1.4	1.2	1.1	1.1	1.5
14	2.5	2.5	1.5	1.3	1.2	1.4	1.1	30	1.5	.....	1.4	1.4	1.1	1.0	1.2
15	2.2	4.0	1.4	1.4	1.2	1.4	1.1	31	1.5	.....	1.5	.....	1.1	.....	1.1
16	2.0	2.2	1.4	1.3	1.3	1.3	1.0								

Daily discharge, in second-feet, of Back Creek near Roanoke, Va., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	55	17	10	72	72	91
2	.....	.....	.....	.....	.....	.....	55	17	10	91	.....	91
3	.....	.....	.....	.....	.....	.....	55	17	27	91	91	91
4	.....	.....	.....	.....	.....	.....	40	17	40	91	72	91
5	.....	.....	.....	.....	.....	.....	40	17	27	91	72	91
6	.....	.....	.....	.....	.....	.....	40	34	17	91	72	91
7	.....	.....	.....	.....	.....	91	40	27	17	91	72	91
8	.....	.....	.....	.....	91	.....	27	17	17	91	72	91
9	.....	.....	.....	.....	91	91	27	17	17	91	72	.....
10	.....	.....	.....	.....	72	72	55	17	17	91	91	.....
11	.....	.....	.....	.....	72	.....	40	72	72	91	91	.....
12	.....	.....	.....	.....	55	91	40	55	27	72	91	.....
13	.....	.....	.....	.....	55	.....	40	91	17	72	91	91
14	.....	.....	.....	.....	40	.....	40	40	17	72	72	.....
15	.....	.....	.....	.....	40	.....	55	27	17	72	72	.....
16	.....	.....	.....	.....	40	.....	40	27	10	72	72	.....
17	.....	.....	.....	.....	40	.....	72	27	10	72	72	.....
18	.....	.....	.....	.....	40	91	40	17	10	72	.....	.....
19	.....	.....	.....	.....	27	72	40	17	10	72	.....	.....
20	.....	.....	.....	.....	27	72	40	17	10	72	91	.....
21	.....	.....	.....	.....	27	64	27	17	17	72	.....	.....
22	.....	.....	.....	.....	27	55	27	91	40	72	.....	.....
23	.....	.....	.....	.....	27	55	27	40	.....	72	.....	.....
24	.....	.....	.....	.....	27	55	27	27	.....	72	.....	.....
25	.....	.....	.....	.....	40	.....	17	17	.....	72	.....	.....
26	.....	.....	.....	.....	27	91	17	17	.....	72	.....	.....
27	.....	.....	.....	.....	27	72	17	17	91	91	.....	.....
28	.....	.....	.....	.....	27	55	17	17	91	91	.....	.....
29	.....	.....	.....	.....	27	.....	27	17	91	72	91	.....
30	.....	.....	.....	.....	27	72	27	17	72	72	91	.....
31	.....	.....	.....	.....	40	.....	17	17	.....	72	.....	.....

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1908.								1908.							
1	.....	91	.....	.....	40	27	55	17	.....	.....	72	55	40	55	17
2	.....	.....	91	.....	40	17	55	18	.....	.....	72	55	40	40	17
3	.....	.....	91	.....	40	27	91	19	.....	.....	72	40	55	40	17
4	.....	.....	91	.....	40	.....	55	20	.....	.....	91	40	72	40	17
5	.....	.....	.....	91	27	91	.....	21	.....	.....	91	40	72	40	17
6	.....	.....	.....	91	27	72	.....	22	.....	.....	91	40	72	40	17
7	.....	.....	.....	91	.....	55	91	23	.....	.....	.....	40	72	40	55
8	.....	.....	.....	91	91	55	91	24	.....	.....	91	40	55	27	40
9	.....	.....	.....	72	72	.....	72	25	.....	.....	91	55	55	27	27
10	.....	.....	.....	72	55	72	55	26	.....	.....	91	55	40	64	.....
11	.....	.....	91	72	40	55	55	27	.....	.....	72	40	40	40	55
12	.....	.....	.....	72	40	.....	40	28	.....	.....	72	27	40	27	40
13	.....	.....	91	55	40	91	40	29	91	.....	72	40	27	27	91
14	.....	.....	91	55	40	72	27	30	91	.....	72	72	27	17	40
15	.....	.....	72	72	40	72	27	31	91	.....	91	.....	27	.....	27
16	.....	.....	72	55	55	55	17								

NOTE.—Daily discharges for 1907 and 1908 are based on a well-defined rating curve. The discharge was greater than 100 second-feet for all missing days from May 13, 1907, to July 31, 1908.

DAN RIVER AT MADISON, N. C.

This station is located at the Southern Railway bridge, about one-fourth mile from Madison and about one-half mile above the mouth of Mayo River. It was established May 14, 1903, and was discontinued December 31, 1908.

The datum of the chain gage has remained the same during the maintenance of the station, but conditions of flow are poor. Both

banks are low and overflow; there is an abrupt turn a short distance below the station; and the bed of sand and gravel changes frequently under the effects of a swift current. The rating for this station has changed from year to year and has only been completed for low stages.[a]

Discharge measurements of Dan River at Madison, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 26	Warren E. Hall	139	282	1.70	568
September 5	F. P. Thomas	140	341	2.58	753

Daily gage height, in feet, of Dan River at Madison, N. C., for 1907 and 1908.

[Observers, J. W. Ore and L. W. Lackey.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.8	1.8	3.2	2.8	2.2	2.9	1.95	1.5	0.9	1.65	1.1	1.75
2	4.1	1.75	3.1	2.2	2.3	9.1	1.9	1.65	.8	1.5	1.15	1.65
3	3.4	1.85	3.7	1.85	2.3	4.4	2.0	1.5	.9	1.4	2.7	1.6
4	3.0	1.8	3.2	1.8	2.5	2.9	2.0	1.4	1.0	1.3	1.6	1.5
5	2.85	1.7	2.5	1.7	2.5	2.4	1.9	1.3	1.2	1.25	1.3	1.5
6	2.6	1.6	2.3	1.95	2.4	2.2	1.85	1.2	2.1	1.25	1.2	1.45
7	2.5	1.4	2.2	9.0	2.3	2.05	3.1	1.25	1.3	1.2	1.15	1.5
8	2.4	1.6	2.2	3.2	2.2	2.3	2.65	1.3	1.05	1.2	1.2	1.55
9	2.4	1.75	2.15	2.95	2.2	2.2	1.5	1.4	1.0	1.3	1.15	1.5
10	2.3	1.85	2.2	2.6	2.6	2.0	1.5	1.5	.9	1.25	1.3	5.6
11	2.2	1.8	3.2	2.4	2.1	2.9	1.5	1.6	3.1	1.2	1.35	3.7
12	2.15	1.75	2.8	2.3	1.9	3.3	1.4	1.6	2.2	1.15	1.4	2.4
13	2.1	1.75	2.5	2.2	1.8	2.65	2.0	1.4	1.7	1.1	1.35	2.15
14	2.1	1.65	2.2	2.0	1.8	7.9	2.15	2.0	1.45	1.1	1.3	4.2
15	2.1	1.7	3.4	2.0	1.75	3.6	7.3	1.5	1.3	1.1	1.25	6.3
16	2.05	1.65	2.7	1.95	2.1	2.7	2.8	1.3	1.15	1.1	1.2	4.2
17	2.0	1.6	2.45	1.95	1.9	2.4	2.0	1.5	1.1	1.1	1.2	2.8
18	1.95	1.6	2.3	1.9	1.75	2.2	2.7	3.5	1.05	1.05	1.2	2.4
19	1.9	1.6	2.2	1.9	1.65	2.0	2.2	1.9	1.0	1.0	1.7	2.3
20	1.9	1.65	2.15	1.9	1.65	1.9	1.9	1.5	1.0	.95	1.4	2.25
21	1.85	1.8	1.9	1.8	1.6	2.2	1.8	1.3	.95	.9	1.6	2.15
22	1.8	1.6	1.9	1.8	1.55	2.0	1.7	1.3	.9	.9	1.5	2.0
23	1.75	1.5	1.8	5.8	1.5	3.1	1.6	1.4	5.2	.9	5.2	12.0
24	1.7	1.5	1.8	5.6	1.5	4.4	1.5	1.3	6.0	1.0	10.3	8.4
25	1.65	1.6	1.75	3.1	1.6	2.3	1.4	1.3	2.5	.95	4.2	3.6
26	1.65	4.4	1.7	2.8	1.7	2.0	1.4	1.1	2.4	.9	3.6	3.1
27	1.7	2.8	1.75	2.5	1.6	1.9	1.5	1.1	2.3	1.0	2.8	2.8
28	1.5	2.7	1.7	3.5	1.5	1.7	1.4	1.0	2.15	1.1	2.4	2.5
29	1.6	.....	1.7	2.9	1.4	2.9	1.4	.9	1.9	1.1	1.9	2.15
30	2.0	.....	1.65	2.5	1.4	2.2	1.8	.9	1.8	1.05	1.8	6.0
31	1.9	.....	1.65	.....	1.4	.....	1.5	.9	.....	1.05	.....	5.2
1908.												
1	4.0	2.1	3.2	2.35	3.8	1.7	1.55	1.5	1.9	1.25	2.6	1.6
2	3.1	2.0	3.0	4.6	2.9	1.6	1.5	1.25	2.8	1.15	2.35	1.85
3	2.7	1.6	2.9	3.2	2.4	1.5	3.3	1.2	2.75	1.15	2.2	1.6
4	2.5	2.0	2.75	2.8	2.2	16.4	3.5	1.1	2.3	1.1	2.1	1.55
5	5.9	2.1	2.5	2.55	2.1	5.7	3.1	1.1	1.95	1.1	2.0	1.75
6	3.4	2.1	5.2	2.5	2.1	3.8	3.0	2.9	5.7	1.0	1.8	1.7
7	14.4	2.7	3.9	2.45	5.0	3.2	2.5	2.4	3.3	.8	1.8	3.0
8	12.9	2.45	3.2	2.4	3.4	2.7	2.35	1.9	2.4	1.0	1.8	4.8
9	4.8	2.25	3.0	2.3	2.65	2.3	2.25	1.75	2.05	1.5	1.8	3.0
10	3.6	2.1	2.9	2.3	2.4	2.25	2.0	1.6	1.8	6.7	1.8	2.5
11	2.9	7.4	2.7	2.2	2.15	2.4	1.7	1.5	1.7	3.8	1.75	2.2
12	14.9	7.2	3.0	2.15	2.1	2.6	1.6	1.4	1.6	2.7	2.2	4.2
13	5.7	8.1	2.8	2.1	2.1	2.4	1.55	1.3	1.5	2.1	1.8	2.9
14	4.1	9.9	2.7	2.1	2.0	2.25	1.65	1.25	1.4	1.85	1.75	2.5
15	3.5	12.8	2.65	2.0	2.0	3.2	1.45	1.2	1.35	1.75	4.0	2.2

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Dan River at Madison, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	3.2	7.3	2.5	3.9	2.05	3.9	1.4	1.2	1.3	1.65	3.0	2.1
17	2.9	4.5	2.45	3.2	2.0	2.8	1.25	1.2	1.3	1.6	2.45	2.0
18	2.7	4.3	2.5	2.6	1.9	2.5	1.2	1.2	1.3	1.5	2.2	1.95
19	2.5	5.4	2.5	2.3	1.9	2.3	1.6	1.25	1.25	1.5	2.1	2.0
20	2.4	4.1	2.6	2.2	2.15	2.1	1.5	1.25	1.25	1.5	2.1	1.9
21	2.35	3.9	2.65	2.1	2.4	3.2	1.4	1.2	1.2	1.45	2.0	1.8
22	2.35	3.6	3.6	2.0	2.45	2.6	3.85	2.1	1.2	1.45	1.8	9.1
23	2.2	3.1	3.9	1.9	2.45	2.2	2.4	2.9	1.2	1.5	1.8	11.0
24	2.0	2.9	5.8	1.9	2.7	2.0	2.0	3.4	1.15	4.0	1.8	4.7
25	1.8	2.75	4.2	2.25	2.35	1.9	1.75	11.2	1.15	1.55	1.8	3.6
26	2.15	4.1	3.4	2.15	1.95	1.8	1.4	20.3	1.1	2.4	1.8	3.4
27	2.4	3.4	3.0	2.1	1.8	1.75	1.25	6.4	1.1	2.1	1.7	2.6
28	2.3	3.3	2.8	2.0	1.75	1.75	2.6	3.2	2.2	1.95	1.65	2.6
29	2.1	3.0	2.7	1.9	1.7	1.65	2.0	2.8	1.75	4.7	1.6	2.5
30	2.0	.....	2.6	5.5	1.9	1.6	1.75	2.35	1.4	5.5	1.6	2.5
31	2.0	.....	2.5	.....	1.8	.....	1.6	2.0	.....	3.4	.....	3.3

Daily discharge, in second-feet, of Dan River at Madison, N. C., for 1906, 1907, and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.												
1	768	994	714	1,150	542	408	526	1,110	1,370	955	750	642
2	678	842	625	898	574	380	510	1,410	1,030	879	732	625
3	625	714	526	768	608	380	625	.....	955	805	696	625
4	.....	625	.....	768	625	366	574	842	1,030	.....	678	608
5	.....	660	1,030	732	642	352	526	678	936	1,240	678	608
6	1,280	732	860	714	526	.....	495	678	805	955	678	591
7	955	696	732	714	768	591	558	591	732	1,070	660	591
8	898	660	660	642	678	625	465	591	696	955	660	574
9	824	625	660	660	574	591	.....	558	660	786	660	558
10	750	696	625	879	465	558	955	558	642	1,030	642	558
11	696	660	558	786	465	805	558	558	591	842	642	842
12	714	625	542	660	465	574	450	495	558	660	678	696
13	.....	625	542	642	465	625	465	.....	.....	625	660	591
14	.....	625	526	625	450	1,240	465	1,030	1,200	625	660	591
15	1,150	591	678	1,030	450	1,030	436	.....	768	608	642	591
16	994	558	.....	917	436	1,200	.....	.....	660	591	678	574
17	898	526	1,070	786	408	1,410	768	.....	660	625	660	574
18	768	558	842	714	408	1,070	.....	.....	660	732	625	.....
19	732	542	678	678	408	805	732	.....	625	.....	805	1,370
20	696	526	.....	660	394	1,370	732	.....	1,200	.....	.....	.....
21	678	510	1,410	642	394	805	.....	.....	860	.....	1,070	.....
22	625	1,070	917	608	394	1,110	.....	1,070	768	.....	917	955
23	.....	917	842	608	394	750	.....	955	994	1,240	805	842
24	.....	714	786	591	380	558	768	879	936	1,070	732	696
25	.....	625	678	558	380	1,110	.....	805	898	994	696	625
26	1,070	591	879	542	366	.....	660	860	768	955	696	574
27	.....	542	842	526	696	879	558	1,070	696	917	678	558
28	.....	860	805	526	625	625	.....	.....	625	879	660	625
29	.....	.....	824	510	495	591	768	.....	625	805	660	768
30	1,370	.....	955	526	465	558	.....	.....	660	805	642	714
31	1,150	.....	.....	.....	436	.....	.....	.....	.....	768	.....	.....
1907.												
1	.....	558	1,070	917	696	955	608	465	298	510	352	542
2	.....	542	1,030	696	732	.....	591	510	272	465	366	510
3	1,150	574	1,280	574	732	.....	625	465	298	436	879	495
4	994	558	1,070	558	805	955	625	436	325	408	495	465
5	936	526	805	526	805	768	591	408	380	394	408	465
6	842	495	732	608	768	696	574	380	660	394	380	450
7	805	436	696	.....	732	642	1,030	394	408	380	366	465
8	768	495	696	1,070	696	732	860	408	338	380	380	480
9	768	542	678	974	696	696	465	436	325	408	366	465
10	732	574	696	842	842	625	465	465	298	394	408	.....
11	696	558	1,070	768	660	955	465	495	1,030	380	422	1,280
12	678	542	917	732	591	1,110	436	495	696	366	436	768
13	660	542	805	696	558	860	625	436	526	352	422	678
14	660	510	696	625	558	.....	678	625	450	352	408	.....
15	660	526	1,150	625	542	1,240	.....	465	408	352	394	.....

Daily discharge, in second-feet, of Dan River at Madison, N. C., for 1906, 1907, and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	642	510	879	608	660	879	917	408	366	352	380	.....
17	625	495	786	608	590	768	625	465	352	352	380	917
18	608	495	732	591	542	696	879	1,200	338	338	380	768
19	591	495	696	591	510	625	696	591	325	325	526	732
20	591	510	678	591	510	591	591	465	325	312	436	714
21	574	558	591	558	495	696	558	408	312	298	495	678
22	558	495	591	558	480	625	526	408	298	298	465	625
23	542	465	558	.....	465	1,030	495	436	.....	298	.....	.....
24	526	465	558	.....	465	.....	465	408	.....	325	.....	.....
25	510	495	542	1,030	495	732	436	408	805	312	.....	1,240
26	510	.....	526	917	526	625	436	352	768	298	1,240	1,030
27	526	917	542	805	495	591	465	352	732	325	917	917
28	465	879	526	1,200	465	526	436	325	678	352	768	805
29	495	.....	526	955	436	955	436	298	591	352	591	678
30	625	.....	510	805	436	696	558	298	558	338	558	.....
31	591	.....	510	.....	436	.....	465	298	.....	338	.....	.....
1908.												
1	1,410	660	1,070	750	1,320	526	480	465	591	394	842	495
2	1,030	625	994	.....	955	495	465	394	917	366	750	574
3	879	495	955	1,070	768	465	1,110	380	898	366	696	495
4	805	625	898	917	696	.....	1,200	352	732	352	660	480
5	.....	660	805	824	660	.....	1,030	352	608	352	625	542
6	1,150	660	.....	805	660	1,320	994	955	.....	325	558	526
7	.....	879	1,370	786	.....	1,070	805	768	1,110	272	558	994
8	.....	786	1,070	768	1,150	879	750	591	768	325	558	.....
9	.....	714	994	732	860	732	714	542	642	465	558	994
10	1,240	660	955	732	768	714	625	495	558	.....	558	805
11	955	.....	879	696	678	768	526	465	526	1,320	542	696
12	.....	.....	994	678	660	842	495	436	495	879	696	.....
13	.....	.....	917	660	660	768	480	408	465	660	558	955
14	.....	.....	879	660	625	714	510	394	436	574	542	805
15	1,200	.....	860	625	625	1,070	450	380	422	542	.....	696
16	1,070	.....	805	1,370	642	1,370	436	380	408	510	994	660
17	955	.....	786	1,070	625	917	394	380	408	495	786	625
18	879	.....	805	842	591	805	380	380	408	465	696	608
19	805	.....	805	732	591	732	495	394	394	465	660	625
20	768	.....	842	696	678	660	465	394	394	465	660	591
21	750	1,370	860	660	768	1,070	436	380	380	450	625	558
22	750	1,240	1,240	625	786	842	1,340	660	380	450	558	.....
23	696	1,030	1,370	591	786	696	768	955	380	465	558	.....
24	625	955	.....	591	879	625	625	1,150	366	1,410	558	.....
25	558	898	.....	714	750	591	542	.....	366	480	558	1,240
26	678	.....	1,150	678	608	558	436	.....	352	768	558	1,150
27	768	1,150	994	660	558	542	394	.....	352	660	526	842
28	732	1,110	917	625	542	542	842	1,070	696	608	510	842
29	660	994	879	591	526	510	625	917	542	.....	495	805
30	625	.....	842	.....	591	495	542	750	436	.....	495	805
31	625	.....	805	.....	558	.....	495	625	.....	1,150	.....	1,110

NOTE.—Daily discharges 1906 to 1908 are based on an approximate rating curve. The discharge was greater than 1,400 second-feet for all missing days.

DAN RIVER AT SOUTH BOSTON, VA.

The station is located at the Norfolk and Western Railroad bridge in the town of South Boston. It was established August 27, 1900, and was discontinued May 5, 1907. The data collected at this point are of value principally for power purposes. Banister River, an important tributary, enters Dan River from the north about 7 miles below the station.

Ice conditions do not materially affect flow. The datum of the chain gage has remained the same since the establishment of the

station. At high stages the right bank overflows for several hundred feet under a curved trestle approach to the bridge. Changing conditions of flow require frequent low-water measurements to adequately define the low-water part of the rating curve.[a]

Daily gage height, in feet, of Dan River at South Boston, Va., for 1907.

[Observer, John R. East.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	Day.	Jan.	Feb.	Mar.	Apr.	May.
1	11.20	2.42	5.30	2.90	4.08	17	2.22	2.45	7.45	2.18	.....
2	9.80	2.55	5.60	3.75	3.50	18	2.08	2.25	4.95	2.28	.....
3	7.95	2.42	5.20	3.95	3.02	19	2.18	2.20	3.08	2.75	.....
4	5.20	2.85	4.60	4.15	3.00	20	2.28	2.35	3.18	2.68	.....
5	3.35	3.02	4.30	4.45	.....	21	2.68	2.40	3.12	2.88	.....
6	3.10	3.18	4.55	5.05	.....	22	2.75	2.12	2.60	3.32	.....
7	2.88	3.18	4.02	6.20	.....	23	2.48	2.02	2.40	3.25	.....
8	2.70	3.22	4.45	6.95	.....	24	2.60	1.92	2.25	3.55	.....
9	2.62	3.55	5.80	6.20	.....	25	2.75	1.85	2.20	4.10	.....
10	2.50	3.78	6.25	5.05	.....	26	2.62	2.05	2.25	4.30	.....
11	2.48	4.05	6.30	4.25	.....	27	2.75	2.48	2.20	4.85	.....
12	2.22	4.10	6.00	3.28	.....	28	2.90	3.92	2.15	4.05	.....
13	2.12	4.25	4.35	2.98	.....	29	2.70	.....	2.08	5.15	.....
14	2.25	2.95	4.90	2.80	.....	30	2.35	.....	2.22	4.62	.....
15	2.12	2.70	7.05	2.50	.....	31	2.15	.....	2.28	.....	.....
16	2.35	2.72	10.00	2.70	.....						

Rating table for Dan River at South Boston, Va., for 1904 to 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.80	1,713	3.10	2,746	4.40	3,824	6.40	5,644
1.90	1,791	3.20	2,827	4.50	3,910	6.60	5,838
2.00	1,870	3.30	2,908	4.60	3,997	6.80	6,034
2.10	1,949	3.40	2,989	4.70	4,084	7.00	6,234
2.20	2,028	3.50	3,070	4.80	4,172	7.20	6,434
2.30	2,107	3.60	3,152	4.90	4,260	7.40	6,638
2.40	2,186	3.70	3,234	5.00	4,349	7.60	6,845
2.50	2,265	3.80	3,317	5.20	4,528	7.80	7,055
2.60	2,345	3.90	3,400	5.40	4,709	8.00	7,275
2.70	2,425	4.00	3,484	5.60	4,892	9.00	8,415
2.80	2,505	4.10	3,568	5.80	5,077	10.00	9,700
2.90	2,585	4.20	3,653	6.00	5,264	11.00	11,100
3.00	2,665	4.30	3,738	6.20	5,453	12.00	12,540

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made 1903 to 1906 and is fairly well defined.

Monthly discharge of Dan River at South Boston, Va., for 1907.

[Drainage area, 2,750 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	11,400	1,930	3,040	1.11	1.28	B.
February	3,700	1,750	2,530	.920	.96	B.
March	9,700	1,930	3,830	1.39	1.60	B.
April	6,180	2,010	3,430	1.25	1.40	B.

[a] Descriptive matter and discharge data collected prior to 1906 have been revised by engineers of the United States Geological Survey and republished in Hydrography of Virginia, Bull. Geol. Survey Virginia No. 3, 1906, pp. 197–207.

Complete records of discharge during the maintenance of the station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

YADKIN OR PEDEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Yadkin River, called Pedee River below the junction with the Uharie, rises on the eastern slope of the Blue Ridge Mountains, in Caldwell and Watauga counties, N. C., and flows in a general southeastward direction across North Carolina and South Carolina, emptying into Winyah Bay at Georgetown, S. C. The total length of the stream from source to mouth in its general direction is about 300 miles. The total drainage area is about 10,600 square miles.

There are no large tributaries in this basin which compare in size with the main stream, as is the case in the Santee River basin. The larger of the tributaries are Little Pedee and Lynches rivers, in South Carolina, and South Yadkin River, in North Carolina.

The upper part of the drainage basin is mountainous and largely forest covered. The extreme upper portion of the basin reaches an elevation of 3,000 feet, but the stream beds while yet small get down to 1,500 feet elevation, and 1,000 feet elevation is reached above Wilkesboro, N. C.

The average amount of rainfall for the basin is 50 to 60 inches in the upper portion and 45 to 50 inches in the lower portion.

In North Carolina the main stream and many of its tributaries have a great amount of power, much of which has been developed.

The following gaging stations have been maintained in this river basin:[a]

Yadkin River, North Wilkesboro, N. C., 1903 to 1908.
Yadkin River, Siloam, N. C., 1900 to 1901.
Yadkin River, Salisbury, N. C., 1895 to 1908.
Yadkin River, Norwood, N. C., 1896 to 1899.

YADKIN RIVER AT NORTH WILKESBORO, N. C.

This station is located at the lower highway bridge between Wilkesboro and North Wilkesboro, about one-half mile below North Wilkesboro railroad station and three-fourths mile below the mouth of Reddie River. It was established April 10, 1903.

The datum of the chain gage has remained the same since the establishment of the station. Discharge measuring conditions are poor, owing to changing conditions of flow. The bed of the stream is mainly composed of rock overlain in places with sand, which shifts frequently. The right bank is low and subject to overflow, but all water must pass beneath the bridge approach. The left bank does

[a] Records of discharge at these stations prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

not overflow. The rating has not been developed for high stages, and owing to shifting channel conditions is not good at low stages.[a]

Discharge measurements of Yadkin River at North Wilkesboro, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 27	Warren E. Hall	97	363	1.33	909
September 4	F. P. Thomas	93	269	.90	584

Daily gage height, in feet, of Yadkin River at North Wilkesboro, N. C., for 1907 and 1908.

[Observer, Mrs. U. H. Wyatt.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4.6	1.6	2.0	1.9	1.85	8.9	1.65	1.15	0.6	0.9	0.45	0.9
2	3.3	1.65	3.1	1.35	1.85	8.7	1.6	1.0	.6	.85	.95	.8
3	2.9	1.6	2.55	1.3	1.85	4.3	1.5	.9	.65	.8	1.0	.8
4	2.7	1.55	2.0	1.25	1.85	3.0	2.55	.9	.9	.8	.7	.75
5	2.5	1.85	1.8	1.25	1.7	2.4	2.0	.85	.8	.9	.6	.7
6	2.4	1.7	1.7	1.85	1.6	2.0	1.7	.9	.7	.7	.6	.6
7	2.3	1.55	1.6	2.95	1.65	1.75	1.5	.95	.6	.65	.6	.6
8	2.2	1.5	1.9	2.1	1.65	1.9	1.3	1.0	.9	.7	.5	.6
9	2.2	1.5	1.75	2.1	1.45	1.7	1.3	1.0	.8	.6	.55	1.05
10	2.1	1.5	1.9	1.8	1.45	1.65	1.3	1.2	.7	.55	.75	3.4
11	2.1	1.5	2.4	1.7	1.45	4.0	1.2	.9	1.15	.5	.8	2.2
12	2.1	1.5	2.1	1.6	1.35	2.3	1.2	1.25	.9	.5	.65	1.55
13	2.0	1.5	1.9	1.6	1.3	2.1	1.6	1.0	.7	.5	.7	1.3
14	2.0	1.5	1.85	1.5	1.3	2.9	1.4	1.1	.6	.5	.6	4.9
15	1.95	1.45	2.1	1.4	1.3	2.15	1.45	.8	.6	.5	.6	3.4
16	1.95	1.4	1.75	1.4	1.3	1.8	1.3	.75	.65	.5	.55	2.4
17	1.95	1.4	1.65	1.4	1.3	1.65	1.3	1.05	.6	.5	.5	1.9
18	1.9	1.4	1.65	1.4	1.2	1.5	2.3	1.6	.8	.5	.65	1.65
19	1.9	1.4	1.65	1.6	1.2	1.45	2.3	1.1	.6	.5	.8	1.55
20	1.85	1.4	1.6	1.45	1.2	1.9	1.35	.9	.55	.5	.6	1.3
21	1.85	1.4	1.5	1.3	1.2	1.5	1.15	.8	.5	.45	1.5	1.2
22	1.85	1.3	1.4	1.3	1.15	1.5	1.1	.9	.6	.5	1.4	1.1
23	1.7	1.3	1.4	3.5	1.1	1.6	1.05	1.1	9.4	.5	1.85	8.6
24	1.7	1.3	1.35	2.4	1.1	2.1	1.05	1.25	3.2	.5	4.0	3.7
25	1.7	1.65	1.35	2.0	1.2	1.6	1.3	.9	1.8	.5	2.05	2.55
26	1.75	2.1	1.3	1.75	1.2	1.75	1.0	.9	1.3	.5	1.5	2.1
27	1.65	1.75	1.3	4.4	1.5	1.35	1.0	.8	1.1	.65	1.2	1.8
28	1.65	1.75	1.3	2.7	1.15	2.2	.95	.75	1.2	.75	1.1	1.65
29	1.6	.....	1.3	2.3	1.05	3.6	1.1	.75	1.55	.5	1.1	1.5
30	1.6	.....	1.25	2.0	1.05	2.25	1.45	.75	1.1	.45	.9	4.1
31	1.6	.....	1.2	.....	1.2	.....	1.05	.7	.....	.45	.....	3.3
1908.												
1	2.4	1.3	2.6	1.8	2.3	1.25	1.4	1.5	1.55	.9	2.2	1.2
2	2.05	1.05	2.5	3.0	2.0	1.2	1.3	1.3	1.45	.8	2.0	1.2
3	1.85	.8	2.5	2.2	1.9	1.2	2.35	1.2	1.3	.8	1.9	1.05
4	1.75	1.2	2.35	1.95	1.8	3.0	3.4	1.1	1.25	.8	1.8	1.0
5	2.05	1.3	2.4	1.8	1.8	1.8	5.1	1.3	1.3	.8	1.6	1.15
6	1.7	1.35	2.5	1.85	1.7	1.55	3.8	2.8	2.0	.8	1.6	1.05
7	2.8	1.45	2.35	1.7	3.8	1.5	3.4	2.8	2.15	.75	1.5	3.4
8	2.6	1.4	2.2	1.7	2.7	1.4	3.0	1.5	1.85	.75	1.45	2.5
9	2.1	1.4	2.1	1.6	2.3	1.35	2.5	1.45	1.3	1.2	1.35	1.8
10	1.8	1.3	2.0	1.6	2.1	1.4	2.1	1.3	1.2	2.85	1.15	1.55
11	1.85	1.65	1.95	1.55	1.9	1.7	1.8	1.2	1.15	1.5	1.3	1.45
12	9.2	4.8	2.25	1.5	1.8	1.8	1.6	1.1	1.1	1.15	1.4	1.7
13	4.4	7.4	2.0	1.4	1.7	1.7	2.1	1.0	1.05	1.0	1.3	1.45
14	3.2	6.9	1.9	1.4	1.6	1.5	1.7	1.05	1.05	.95	1.55	1.3
15	2.5	12.9	1.85	2.05	1.55	3.2	1.5	1.0	1.0	.95	1.6	1.3

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Yadkin River at North Wilkesboro, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	2.25	5.4	1.8	3.4	1.55	2.3	1.4	1.1	.95	.95	1.4	1.25
17	2.05	4.2	1.7	2.55	1.5	1.7	1.3	1.15	.95	.9	1.4	1.2
18	1.85	3.0	1.7	2.2	1.5	1.6	1.3	1.75	.9	.85	1.35	1.2
19	1.7	3.0	1.65	2.05	2.25	1.5	1.3	1.3	.9	.85	1.3	1.2
20	1.6	2.8	1.9	1.9	1.9	2.35	1.2	1.15	.9	.85	1.3	1.1
21	1.5	2.45	2.1	1.7	1.9	2.2	1.3	1.15	.9	.8	1.3	1.1
22	1.5	2.35	2.0	1.6	1.6	1.55	1.7	1.45	.9	.9	1.2	2.9
23	1.45	2.15	2.3	1.6	1.8	2.9	1.5	1.5	.9	5.2	1.2	2.95
24	1.3	2.05	2.85	1.55	1.6	1.9	1.7	2.1	.85	8.6	1.2	2.4
25	1.25	2.0	2.35	3.0	1.5	1.5	1.3	5.9	.85	3.65	1.2	2.2
26	1.3	2.8	2.1	3.2	1.5	1.3	1.15	7.7	.85	2.65	1.2	2.05
27	1.5	2.7	1.95	2.6	1.4	1.25	1.3	3.4	.9	2.2	1.15	1.85
28	1.25	2.3	1.9	2.35	1.4	1.1	1.5	2.6	1.6	2.35	1.15	1.7
29	1.3	2.2	1.8	2.1	1.7	1.1	2.3	2.2	1.2	3.95	1.1	1.6
30	1.15	.....	1.7	2.55	1.6	1.1	2.9	1.9	1.0	3.6	1.1	1.6
31	1.1	.....	1.7	.....	1.35	.....	1.8	1.7	.....	2.7	.....	1.8

Rating table for Yadkin River at North Wilkesboro, N. C., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.40	470	1.90	1,285	3.40	2,580	5.80	4,900
.50	510	2.00	1,360	3.50	2,670	6.00	5,100
.60	550	2.10	1,435	3.60	2,760	6.20	5,300
.70	590	2.20	1,515	3.70	2,855	6.40	5,500
.80	635	2.30	1,595	3.80	2,950	6.60	5,700
.90	680	2.40	1,680	3.90	3,045	6.80	5,900
1.00	730	2.50	1,770	4.00	3,140	7.00	6,100
1.10	780	2.60	1,860	4.20	3,330	8.00	7,100
1.20	835	2.70	1,950	4.40	3,520	9.00	8,100
1.30	890	2.80	2,040	4.60	3,710	10.00	9,100
1.40	950	2.90	2,130	4.80	3,900	11.00	10,100
1.50	1,010	3.00	2,220	5.00	4,100	12.00	11,100
1.60	1,075	3.10	2,310	5.20	4,300	13.00	12,100
1.70	1,145	3.20	2,400	5.40	4,500		
1.80	1,215	3.30	2,490	5.60	4,700		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on one discharge measurement made during 1907 and the form of the 1906 curve. It is not well defined. Above gage height 4.8 feet the rating curve is a tangent, the difference being 100 per tenth.

Monthly discharge of Yadkin River at North Wilkesboro, N. C., for 1907 and 1908.

[Drainage area, 500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	3,710	1,080	1,480	2.96	3.41	C.
February	1,440	890	1,040	2.08	2.17	C.
March	2,310	835	1,180	2.36	2.72	C.
April	3,520	862	1,320	2.64	2.94	C.
May	1,250	755	945	1.89	2.18	C.
June	8,000	920	1,940	3.88	4.33	C.
July	1,820	705	982	1.96	2.26	C.
August	1,080	590	716	1.43	1.65	C.
September	8,500	510	985	1.97	2.20	C.
October	680	490	546	1.09	1.26	C.
November	3,140	490	778	1.56	1.74	C.
December	7,700	550	1,570	3.14	3.62	C.
The year	8,500	490	1,120	2.25	30.48	

Monthly discharge of Yadkin River at North Wilkesboro, N. C., for 1907 and 1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches in drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.						
January	8,300	780	1,560	3.12	3.60	C.
February	12,000	635	2,320	4.64	5.00	C.
March	2,080	1,110	1,440	2.88	3.32	C.
April	2,580	950	1,430	2.86	3.19	C.
May	2,950	920	1,260	2.52	2.90	C.
June	2,400	780	1,180	2.36	2.63	C.
July	4,200	808	1,430	2.86	3.30	C.
August	6,800	730	1,420	2.84	3.27	C.
September	1,480	658	836	1.67	1.86	C.
October	7,700	612	1,430	2.86	3.30	C.
November	1,520	780	965	1.93	2.15	C.
December	2,580	730	1,160	2.32	2.68	C.
The year	12,000	612	1,370	2.74	37.20	

YADKIN RIVER NEAR SALISBURY, N. C.

This station is located at Piedmont toll bridge, about 6 miles east of Salisbury, N. C., and 1,000 feet above the Southern Railway bridge. It is about 5 miles below the mouth of South Yadkin River.

This station was originally established September 24, 1895, and has been partly maintained at the present location at the toll bridge, and partly at the Southern Railway bridge, where a second gage has been installed. Previously published records of gage heights refer to the gage on the railroad bridge from 1895 to May 31, 1899, and from 1903 to 1905, inclusive. The highway bridge was used from June 1, 1899, to December 31, 1902, and from January 1, 1906, to date. The relation between the two gages at low stages as based on a comparison made during 1905 and 1906 is as follows:

Relation of gages on Yadkin River.

Gage at Southern Railway bridge.	Gage at Piedmont toll bridge.
1.0	1.45
2.0	2.22
3.0	3.05
4.0	3.92
5.0	4.83
6.0	5.78
7.0	6.77
8.0	7.76
9.0	8.75

The datums of the chain gages have remained the same since their establishment. The bed of the stream is composed mainly of rock, but the collection of driftwood against the piers and sand on the bed of the river causes a variable relation between discharge and gage height. Records of discharge collected at this point are, however,

fairly accurate. Overflow of the left bank occurs for a short distance at extreme high stages. The right bank does not overflow.[a]

Discharge measurements of Yadkin River near Salisbury, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907. March 28	Warren E. Hall	472	2,190	2.74	3,550
1908. May 14	Warren E. Hall	472	2,190	2.73	3,620

Daily gage height, in feet, of Yadkin River near Salisbury, N. C., for 1907 and 1908.

[Observer, J. T. Yarbrough.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.2	2.6	3.2	2.8	3.0	2.5	4.0	2.45	2.0	2.7	2.2	2.6
2	5.5	2.6	3.35	3.1	2.95	6.0	3.1	2.45	2.0	2.5	2.25	2.5
3	4.1	2.75	3.9	2.8	2.9	6.4	3.3	2.4	2.0	2.4	2.4	2.5
4	3.6	2.75	3.65	2.65	3.05	4.3	3.2	2.4	2.1	2.4	2.7	2.45
5	3.4	2.6	3.15	2.6	3.1	3.45	2.9	2.55	2.15	2.3	2.4	2.4
6	3.25	2.8	3.0	2.6	2.9	3.0	2.9	2.3	2.9	2.3	2.3	2.45
7	3.1	2.8	2.9	5.2	2.7	2.85	2.85	2.4	2.4	2.4	2.2	2.35
8	3.0	2.6	2.8	4.4	2.7	2.65	2.8	2.6	2.05	2.3	2.25	2.45
9	3.0	2.6	2.95	3.65	2.8	2.75	2.6	2.55	2.1	2.4	2.25	2.5
10	2.95	2.75	3.9	3.25	2.9	2.9	2.55	2.7	2.1	2.3	2.35	3.1
11	2.9	2.75	3.6	3.1	2.8	4.2	2.5	3.25	2.2	2.2	2.5	4.4
12	2.8	2.75	3.45	2.9	2.7	6.9	2.55	2.6	3.2	2.2	2.45	3.65
13	2.9	2.6	3.2	2.85	2.65	4.3	2.8	2.4	2.7	2.15	2.4	3.1
14	2.9	2.6	3.05	2.8	2.5	3.6	3.0	2.6	2.25	2.25	2.25	4.6
15	2.8	2.6	3.4	2.8	2.45	4.2	3.0	2.6	2.1	2.2	2.4	7.7
16	2.75	2.55	3.45	2.65	2.5	3.6	2.75	2.4	2.2	2.2	2.3	5.7
17	2.7	2.6	3.3	2.6	2.55	3.1	2.7	2.25	2.1	2.2	2.3	4.2
18	2.7	2.65	3.0	2.65	2.55	2.75	3.2	2.9	2.05	2.2	2.3	3.5
19	2.8	2.6	2.9	2.6	2.55	2.65	3.05	3.15	2.1	2.1	2.3	3.15
20	2.8	2.6	2.85	2.7	2.5	2.6	3.0	2.65	2.05	2.1	2.5	3.0
21	2.75	2.8	2.8	2.75	2.35	2.7	2.8	2.4	2.0	2.15	2.45	2.8
22	2.7	2.65	2.8	2.7	2.35	2.95	2.6	2.3	1.95	2.1	2.7	2.8
23	2.7	2.55	2.7	3.65	2.35	2.7	2.4	3.4	2.4	2.1	4.3	6.1
24	2.6	2.6	2.7	4.6	2.35	3.9	2.4	2.3	8.0	2.2	7.0	9.8
25	2.6	2.75	2.7	4.1	2.35	3.35	2.4	2.35	4.5	2.1	6.7	6.3
26	2.6	3.4	2.6	3.35	2.5	3.05	2.3	2.3	3.1	2.1	4.4	4.2
27	2.75	3.6	2.6	3.1	2.55	2.7	2.4	2.2	2.7	2.0	3.45	3.6
28	2.7	3.25	2.65	4.2	2.55	3.15	2.4	2.2	2.6	2.25	2.95	3.3
29	2.6	.....	2.6	3.7	2.4	2.95	2.4	2.1	2.85	2.3	2.75	3.1
30	2.55	.....	2.5	3.2	2.3	5.0	2.4	2.1	3.0	2.2	2.8	3.5
31	2.6	.....	2.6	.....	2.3	.....	2.6	2.1	.....	2.2	.....	5.8
1908.												
1	4.5	2.9	3.3	3.2	4.3	2.65	2.4	2.7	2.9	2.5	4.0	2.7
2	3.65	3.3	3.4	4.0	3.55	2.6	2.5	2.5	2.85	2.3	3.45	2.75
3	3.3	3.0	3.35	4.6	3.15	2.5	4.0	2.5	2.7	2.3	3.2	2.8
4	3.1	2.7	3.3	3.75	3.0	3.3	4.6	2.4	2.65	2.35	3.1	2.7
5	3.9	2.9	3.25	3.35	3.0	6.2	5.6	2.35	2.8	2.4	3.05	2.6
6	3.8	3.0	3.8	3.2	2.9	3.8	5.4	3.0	5.7	2.3	2.95	2.7
7	5.1	3.35	3.9	3.2	3.2	3.15	4.5	3.4	5.1	2.35	2.8	3.0
8	8.3	3.15	3.4	3.15	4.1	2.95	3.8	3.05	5.1	2.35	2.85	4.8
9	6.2	3.05	3.3	3.1	3.8	2.65	3.9	2.9	4.5	2.4	2.8	3.9
10	4.2	3.0	3.3	3.0	3.3	2.7	3.9	2.9	3.35	4.0	2.8	3.2
11	3.5	3.05	3.25	3.0	3.2	2.85	3.45	2.6	3.05	6.9	2.8	3.1
12	7.4	3.95	3.4	2.95	2.95	2.85	3.0	2.7	2.65	4.2	3.1	3.35
13	9.1	6.3	3.6	2.9	3.0	3.4	2.8	2.45	2.6	3.2	3.0	3.5
14	5.7	8.15	3.4	2.9	2.8	2.9	2.75	2.5	2.6	2.8	3.2	3.15
15	4.3	8.7	3.25	2.9	2.8	2.9	2.9	2.2	2.5	2.8	5.0	3.0

[a] Records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Yadkin River near Salisbury, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	3.6	11.3	3.15	3.75	2.75	3.85	2.65	2.25	2.5	2.7	4.1	2.95
17	3.4	7.5	3.1	4.1	2.65	3.3	2.55	2.4	2.45	2.5	3.5	2.9
18	3.25	4.8	3.1	3.6	2.8	2.85	2.5	2.25	2.4	2.5	3.1	2.9
19	3.1	4.5	3.15	3.35	3.3	2.75	2.45	2.35	2.35	2.5	3.0	2.8
20	3.0	5.0	3.1	3.2	3.4	2.75	2.65	2.8	2.4	2.4	2.95	2.8
21	3.0	4.6	3.4	3.1	3.6	3.0	2.5	2.8	2.5	2.5	2.85	2.8
22	2.95	4.0	3.75	3.0	3.2	3.45	3.3	2.75	2.4	2.5	2.8	4.0
23	2.9	3.65	3.8	2.9	3.35	2.9	3.7	2.95	2.4	2.7	2.8	8.3
24	2.9	3.5	7.1	2.9	3.15	3.0	3.5	4.8	2.4	5.2	2.7	7.2
25	2.7	3.35	6.5	3.05	3.0	2.8	3.0	6.8	2.4	7.1	2.75	4.8
26	2.75	3.45	4.7	3.1	2.8	2.7	2.9	13.4	2.3	4.7	2.7	3.9
27	2.95	3.9	3.8	3.5	2.7	2.55	2.55	14.1	2.3	3.7	2.7	3.55
28	3.05	3.75	3.55	3.2	2.7	2.7	2.65	7.3	2.7	3.4	2.7	3.3
29	2.9	3.55	3.3	3.2	2.7	2.5	3.3	4.2	3.05	4.6	2.7	3.2
30	2.8	.....	3.25	3.0	2.8	2.4	2.8	3.5	2.9	6.2	2.7	3.1
31	2.8	.....	3.15	.....	2.8	.....	3.2	3.15	.....	5.2	.....	3.5

Rating table for Yadkin River near Salisbury, N. C., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.90	1,460	3.30	5,390	4.70	10,840	7.00	21,700
2.00	1,680	3.40	5,740	4.80	11,270	7.20	22,720
2.10	1,910	3.50	6,100	4.90	11,710	7.40	23,760
2.20	2,150	3.60	6,460	5.00	12,150	7.60	24,800
2.30	2,400	3.70	6,830	5.20	13,040	7.80	25,860
2.40	2,660	3.80	7,210	5.40	13,940	8.00	26,940
2.50	2,930	3.90	7,590	5.60	14,860	9.00	32,780
2.60	3,210	4.00	7,980	5.80	15,800	10.00	39,300
2.70	3,500	4.10	8,370	6.00	16,750	11.00	46,080
2.80	3,790	4.20	8,770	6.20	17,710	12.00	53,000
2.90	4,090	4.30	9,170	6.40	18,690	13.00	60,000
3.00	4,400	4.40	9,580	6.60	19,680	14.00	67,100
3.10	4,720	4.50	9,990	6.80	20,680	15.00	74,200
3.20	5,050	4.60	10,410				

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on two discharge measurements made during 1907 and 1908 and on the general form of earlier rating curves. It is fairly well defined.

This table supersedes the rating table used for 1907 in the Water powers of North Carolina: Bull. North Carolina Geol. Survey (in press).

Monthly discharge of Yadkin River near Salisbury, N. C., for 1907 and 1908.

[Drainage area, 3,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	22,700	3,070	5,020	1.48	1.71	B.
February	6,460	3,070	3,640	1.07	1.11	B.
March	7,590	2,930	4,600	1.35	1.56	B.
April	13,000	3,210	5,230	1.54	1.72	B.
May	4,720	2,400	3,280	.965	1.11	B.
June	21,200	2,930	6,750	1.99	2.22	B.
July	7,980	2,400	3,750	1.10	1.27	B.
August	5,740	1,910	2,960	.871	1.00	B.
September	26,900	1,570	3,610	1.06	1.18	B.
October	3,500	1,680	2,260	.665	.77	B.
November	21,700	2,150	4,510	1.33	1.48	B.
December	38,000	2,530	8,210	2.41	2.78	B.
The year	38,000	1,570	4,480	1.32	17.91	

Monthly discharge of Yadkin River near Salisbury, N. C., for 1907 and 1908—Cont'd.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.						
January	33,400	3,500	8,640	2.54	2.93	B.
February	48,200	3,500	10,500	3.09	3.33	B.
March	22,200	4,720	6,840	2.01	2.32	B.
April	10,400	4,090	5,360	1.58	1.76	B.
May	9,170	3,360	4,860	1.43	1.65	B.
June	17,700	2,660	4,660	1.37	1.53	B.
July	14,900	2,660	5,580	1.64	1.89	B.
August	67,800	2,150	9,120	2.68	3.09	B.
September	15,300	2,400	4,540	1.34	1.50	B.
October	22,200	2,400	6,370	1.87	2.16	B.
November	12,200	3,500	4,730	1.39	1.55	B.
December	28,600	3,210	6,600	1.94	2.24	B.
The year	67,800	2,150	6,480	1.91	25.95	

NOTE.—The above monthly discharge for 1907 supersedes the corresponding table given in Water powers of North Carolina: Bull. North Carolina Geol. Survey (in press).

MISCELLANEOUS MEASUREMENT IN YADKIN RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurement was made in Yadkin River drainage basin November 13, 1908:

Yadkin River, 1,500 feet below Nottingham Power Company dam, Pedee, N. C.

Gage height referred to Rockingham Power Company's gage, 89.70 feet; discharge, 89 second-feet.

SANTEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Santee River, which is formed by the Congaree and Wateree rivers, drains a large area beginning in the Blue Ridge Mountains in western North Carolina and extending through the central portion of South Carolina to the Atlantic Ocean. Its total length, in the general direction of the course of the river, is about 300 miles.

Wateree River, the more northerly of the two parent streams, rises on the eastern slope of the Blue Ridge Mountains in McDowell County, N. C., and flows first eastward, then in a general southeasterly direction, across North Carolina and a portion of South Carolina, to its junction with the Congaree. In North Carolina, and also that part of its course in South Carolina above Wateree Creek, it is known as Catawba River.

The Congaree, the second of the two streams which by their union make the Santee, is formed by the junction of Broad and Saluda rivers at Columbia, S. C., whence it flows in a southeasterly direction for about 60 miles to its junction with the Wateree. Broad River rises on the eastern slope of the Blue Ridge Mountains in McDowell and Henderson counties, N. C., and Saluda River rises in Pickens and Greenville counties, S. C.

The upper portion of the basin is mountainous, its extreme elevation being 3,000 to 5,000 feet for Catawba River, and from 2,000 to 3,000 feet for Broad and Saluda rivers. These upper portions, even to a much lower elevation than mentioned above, are largely covered with forests, but the greater part of the basin lies in an agricultural section where much of the land is in cultivation.

The average annual rainfall is from 45 inches in the central and lower portions to 60 inches near the headwaters.

Above the fall line, which passes near Camden and Columbia, S. C., there are excellent water powers everywhere, and many large powers have already been developed.

The following gaging stations have been maintained in this river basin:[a]

Catawba River, Old Fort, N. C., 1907.
Catawba River, Morganton, N. C., 1900–1908.
Catawba River, Catawba, N. C., 1896–1905.
Catawba River, Rockhill, S. C., 1895–1903.
Wateree River, Camden, S. C., 1904–1908.
Mill Creek, Old Fort, N. C., 1907.
Linville River, Fonta Flora, N. C., 1907–8.
Linville River, Bridgewater, N. C., 1900.
Johns River, Collettsville, N. C., 1907.
Johns River, Morganton, N. C., 1900–1901.
Broad River (of the Carolinas), Uree, N. C., 1907–8.
Broad River (of the Carolinas), Dellinger, S. C., 1900–1901.
Broad River (of the Carolinas), Gaffney, S. C., 1896–1899.
Broad River (of the Carolinas), Alston, S. C., 1896–1907.
Green River, Saluda, N. C., 1907–8.
Second Broad River, Logan's store, N. C., 1907–8.
Saluda River, Waterloo, S. C., 1896–1905.
Saluda River, Ninety-six, S. C., 1905.

CATAWBA RIVER AT OLD FORT, N. C.

The station is located at a wooden wagon bridge one-half mile south of Old Fort, and one-fourth mile above the mouth of Mill Creek. It was established May 24, 1907, and discontinued December 31, 1907.

The vertical staff gage is attached to the bridge from which discharge measurements are made. The bed of the stream is sandy and liable to shift. An approximate low-water rating has been developed.[b]

[a] All records of discharge at stations in North Carolina prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

[b] All records of discharge at this station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Catawba River at Old Fort, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 24	Warren E. Hall	25	34	1.00	20
May 25	do	25	35	1.03	22
July 10	do	26	30	0.93	15
Do	do	26	30	0.93	15
September 25	do	27	35	1.00	14

Daily gage height, in feet, of Catawba River at Old Fort, N. C., for 1907.

[Observer, W. A. Thomas.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						2.4	1.1	1.1	0.9	1.0	1.0	1.0
2						2.1	1.0	1.1	.9	1.0	1.0	1.2
3						2.0	1.0	1.1	.9	1.0	1.0	1.0
4						2.4	1.0	1.1	.9	1.0	1.0	1.0
5						2.2	1.0	1.1	.9	1.0	1.0	1.0
6						2.1	1.0	1.1	.9	1.0	1.0	1.0
7						2.2	1.0	1.2	1.5	1.0	1.0	.9
8						2.1	1.0	1.1	1.4	1.0	1.0	.9
9						1.8	1.0	1.1	1.4	1.0	1.0	.9
10						1.6	1.0	1.1	1.3	1.0	1.0	.9
11						1.6	1.0	1.0	1.3	1.0	1.0	.9
12						1.4	1.1	1.0	1.2	1.0	1.0	.8
13						1.4	1.1	1.0	1.0	1.0	1.0	.8
14						1.6	1.0	1.0	1.0	1.0	1.0	1.2
15						1.4	1.1	1.1	1.0	1.0	1.0	1.6
16						1.3	1.4	1.1	1.0	1.0	1.0	1.5
17						1.2	1.2	1.2	1.0	1.0	1.0	1.4
18						1.1	1.2	1.2	1.0	1.0	1.0	1.2
19						1.1	1.1	1.1	1.0	1.0	1.0	1.1
20						1.1	1.1	1.1	1.0	1.0	1.0	1.1
21						1.1	1.1	1.0	1.0	.9	1.2	1.1
22						1.1	1.0	1.0	1.0	.9	1.1	1.1
23						1.1	1.0	1.0	2.2	.9	1.0	1.1
24					1.0	1.2	1.0	1.0	1.6	.9	1.5	1.0
25					1.1	1.1	1.2	.9	1.0	.9	1.4	1.0
26					1.1	1.1	1.1	.9	1.0	1.3	1.3	1.0
27					1.2	1.1	1.1	.9	1.0	1.3	1.2	1.0
28					1.3	1.1	1.0	.9	1.4	1.2	1.1	2.2
29					1.3	1.1	1.0	.9	1.2	1.2	1.0	2.0
30					1.2	1.1	1.1	.9	1.0	1.2	1.0	1.8
31					1.2		1.1	.9		1.1		1.6

Daily discharge in second-feet of Catawba River at Old Fort, N. C., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							27	27	13	19	19	19
2							19	27	13	19	19	36
3							19	27	13	19	19	19
4							19	27	13	19	19	19
5							19	27	13	19	19	19
6							19	27	13	19	19	19
7							19	36		19	19	13
8							19	27		19	19	13
9							19	27		19	19	13
10							19	27	46	19	19	13
11							19	19	46	19	19	13
12							27	19	36	19	19	8
13							27	19	19	19	19	8
14							19	19	19	19	19	36
15							27	27	19	19	19	

Daily discharge in second-feet of Catawba River at Old Fort, N. C., for 1907—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	.....	.....	.....	.....	.....	46	.....	27	19	19	19	.....
17	.....	.....	.....	.....	.....	36	36	36	19	19	19	.....
18	.....	.....	.....	.....	.....	27	36	36	19	19	19	36
19	.....	.....	.....	.....	.....	27	27	27	19	19	19	27
20	.....	.....	.....	.....	.....	27	27	27	19	19	19	27
21	.....	.....	.....	.....	.....	27	27	19	19	13	36	27
22	.....	.....	.....	.....	.....	27	19	19	19	13	27	27
23	.....	.....	.....	.....	.....	27	19	19	.....	13	19	27
24	.....	.....	.....	.....	19	36	19	19	.....	13	.....	19
25	.....	.....	.....	.....	27	27	36	13	19	13	.....	19
26	.....	.....	.....	.....	27	27	27	13	19	46	46	19
27	.....	.....	.....	.....	36	27	27	13	19	46	36	19
28	.....	.....	.....	.....	46	27	19	13	.....	36	27	.....
29	.....	.....	.....	.....	46	27	19	13	36	36	19	.....
30	.....	.....	.....	.....	36	27	27	13	19	36	19	.....
31	.....	.....	.....	.....	36	.....	27	13	.....	27	.....	.....

NOTE.—Daily discharge based on an approximate rating curve. Beginning May 24 the discharge for all missing days was greater than 50 second-feet.

CATAWBA RIVER NEAR MORGANTON, N. C.

This station was originally established June 19, 1900, at the highway bridge on the road from Morganton to Hartland. It is 1 mile north of Morganton and about 200 yards below the mouth of Upper Creek. In May, 1901, the river throughout this part of its course was from 8 to 15 feet higher than ever before known, and the bridge and gage were destroyed. The present station was established May 15, 1903, and has been maintained continuously to the present time, except from July 1, 1906, to January 16, 1907, when no gage reader was available, and from December 22 to 31, 1907. It is located at the bridge which was built in place of the one carried away by the flood of May, 1901.

The datum of the gage has remained the same since May 15, 1903. There is no relation between the datum of the original and the present gages. The right bank overflows slightly; the left bank does not overflow. A fairly good low-water rating has been developed, and conditions of flow are generally constant, except for relatively short periods.[a]

Discharge measurements of Catawba River near Morganton, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 1	Warren E. Hall	170	550	1.93	1,230
May 21	do	170	476	1.50	816
September 27	do	160	560	1.58	913
1908.					
May 16	Warren E. Hall	171	521	1.72	1,060

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Catawba River near Morganton, N. C., for 1907 and 1908.

[Observers, Erwin Edmonston and Oscar A. Gillam.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	1.9	1.9	2.0	1.95	9.1	1.8	1.35	1.1	1.45	1.15	1.45
2	.....	1.9	3.0	1.7	1.85	5.4	1.7	1.3	1.1	1.4	1.4	1.4
3	.....	1.85	2.3	1.6	2.05	3.35	1.65	1.25	1.1	1.35	1.4	1.4
4	.....	1.8	2.0	1.6	2.15	2.75	1.6	1.2	1.15	1.35	1.25	1.45
5	.....	2.0	1.95	1.55	2.1	2.5	1.55	1.2	1.15	1.35	1.2	1.45
6	.....	1.9	1.9	1.6	1.9	2.35	1.6	1.25	1.15	1.35	1.2	1.4
7	.....	1.8	1.9	1.6	1.85	2.2	1.5	1.2	1.15	1.3	1.15	1.4
8	.....	1.8	1.95	1.55	1.8	2.25	1.45	1.2	1.15	1.3	1.15	1.35
9	.....	1.75	1.9	1.65	1.95	2.2	1.4	1.25	1.1	1.3	1.15	3.15
10	.....	1.75	2.95	1.6	1.8	2.2	1.35	1.3	1.1	1.25	1.35	2.1
11	.....	1.7	2.35	1.65	1.85	2.15	1.65	1.25	1.1	1.25	1.25	1.9
12	.....	1.7	2.1	1.65	1.8	2.15	1.7	1.25	2.4	1.25	1.25	1.85
13	.....	1.7	2.0	1.65	1.7	2.1	5.5	1.3	2.1	1.2	1.2	1.75
14	.....	1.7	2.3	1.65	1.7	2.2	3.5	1.25	1.75	1.2	1.2	6.0
15	.....	1.7	2.1	1.65	1.7	2.1	2.0	1.25	1.5	1.2	1.2	3.6
16	2.0	1.65	1.9	1.6	1.65	1.9	1.9	1.2	1.25	1.2	1.15	2.9
17	1.95	1.7	1.85	1.6	1.6	1.8	1.7	1.3	1.1	1.15	1.35	2.6
18	1.95	1.65	1.8	1.6	1.55	1.6	1.75	1.9	1.1	1.15	1.3	2.0
19	1.9	1.65	1.8	2.0	1.5	1.6	1.65	1.65	1.05	1.15	1.3	1.9
20	1.85	1.7	1.8	1.75	1.5	1.7	1.5	1.3	1.05	1.15	1.3	1.8
21	1.8	1.65	1.75	1.65	1.5	1.65	1.45	1.25	1.05	1.15	2.05	1.75
22	1.8	1.6	1.8	1.7	1.45	1.6	1.4	1.8	1.05	1.15	1.9	.....
23	1.8	1.6	1.7	3.0	1.45	1.65	1.35	1.5	9.9	1.15	3.0	.....
24	1.75	1.85	1.65	2.35	1.45	2.3	1.55	1.5	2.95	1.15	4.2	.....
25	1.7	1.8	1.65	2.05	1.7	2.0	1.5	1.4	2.05	1.15	2.1	.....
26	1.8	1.9	1.65	1.9	1.7	1.8	1.4	1.3	1.75	1.15	1.9	.....
27	1.8	1.9	1.6	2.15	1.7	1.7	1.35	1.2	1.6	1.35	1.7	.....
28	1.75	2.05	1.6	2.4	1.6	2.15	1.35	1.2	1.65	1.25	1.6	.....
29	1.7	.....	1.6	2.2	1.45	2.35	1.35	1.2	1.6	1.2	1.5	.....
30	1.75	.....	1.6	2.05	1.45	1.9	1.4	1.15	1.6	1.15	1.5	.....
31	1.75	.....	.....	.....	1.75	.....	1.4	1.1	.....	1.15	.....	.....
1908.												
1	2.6	1.6	2.55	2.0	2.0	2.0	2.0	1.8	3.9	1.55	6.0	1.75
2	2.3	1.65	2.4	2.0	1.85	1.95	2.55	1.9	3.9	1.55	5.9	1.75
3	2.1	1.7	2.3	1.95	1.75	2.0	3.0	1.95	3.85	1.5	5.8	1.75
4	2.0	1.75	2.4	1.95	1.65	2.05	3.5	1.9	3.8	1.45	5.6	1.8
5	2.5	1.8	2.3	1.95	3.55	2.05	4.0	1.9	3.8	1.45	5.5	1.8
6	2.1	1.8	2.3	1.95	2.85	2.0	3.05	1.9	3.6	1.45	5.3	1.8
7	2.6	1.8	2.3	1.8	2.5	2.0	2.8	2.0	3.55	1.4	5.0	1.8
8	2.3	1.85	2.25	1.8	2.3	2.05	2.55	2.05	3.4	1.4	4.5	1.9
9	2.05	1.85	2.1	1.75	2.15	2.0	2.55	2.95	3.35	2.5	4.2	1.9
10	1.9	1.9	2.1	1.7	2.05	2.0	2.4	2.95	3.3	2.4	4.0	1.95
11	2.7	2.0	2.15	1.65	1.95	1.95	2.2	2.95	3.25	2.25	3.5	1.95
12	10.2	2.5	2.4	1.65	1.9	1.95	1.9	2.9	3.25	2.15	3.2	2.0
13	7.8	2.5	2.25	1.6	1.85	1.9	1.9	2.0	3.15	2.0	2.0	1.95
14	4.4	6.0	2.15	2.4	1.8	1.9	1.9	2.25	3.15	2.0	1.9	1.9
15	2.9	12.0	2.0	2.35	1.8	1.8	1.85	2.1	3.0	2.95	1.9	1.85
16	2.5	4.6	2.0	2.3	1.75	1.8	1.85	2.0	2.9	2.9	1.9	1.8
17	2.35	3.6	1.95	2.2	1.75	1.75	1.8	2.0	2.85	2.85	1.9	1.75
18	2.35	3.3	1.95	2.1	1.75	1.7	1.8	2.95	2.7	2.75	1.85	1.7
19	2.35	3.0	1.9	2.0	2.5	1.8	1.8	2.95	2.75	2.7	1.85	1.7
20	2.05	2.8	2.2	1.9	2.35	1.9	1.95	2.5	2.6	2.6	1.85	1.65
21	2.0	2.6	2.5	1.8	2.25	1.95	1.95	2.3	2.5	2.4	1.85	3.9
22	1.95	2.4	2.75	1.75	2.25	2.0	1.9	3.0	2.4	2.35	1.8	2.7
23	1.8	2.3	3.0	1.75	2.55	1.85	1.8	4.0	2.2	9.5	1.8	2.4
24	1.75	2.35	3.9	1.6	2.35	1.7	1.8	4.6	2.15	9.0	1.7	2.25
25	1.6	2.35	3.6	3.5	2.0	1.7	1.7	11.2	2.15	8.4	1.7	.....
26	1.7	2.45	3.4	2.75	1.85	1.65	1.8	14.8	1.85	8.5	1.7	.....
27	1.8	2.45	3.25	2.5	1.85	1.65	1.9	5.7	1.75	8.2	1.7	2.25
28	1.8	2.5	3.0	2.25	1.9	1.65	1.8	4.8	1.65	7.8	1.65	2.35
29	1.7	2.5	2.75	2.0	1.85	1.65	1.8	4.2	1.6	7.5	1.65	2.3
30	1.6	.....	2.4	2.5	2.0	1.5	1.8	4.0	1.5	7.4	1.65	2.25
31	1.55	.....	3.0	.....	2.0	.....	1.9	3.95	.....	7.0	.....	2.05

NOTE.—August 26, 1908, the highest recorded gage height was 22.0 feet, which is the highest recorded since the reestablishment of the station in 1903. The stage of the flood of May, 1901, was, however, nearly twice as high.

Rating table for Catawba River near Morganton, N. C., for 1906, 1907, and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.00	400	2.40	1,900	3.80	3,800	6.40	8,540
1.10	470	2.50	2,030	3.90	3,950	6.60	8,960
1.20	550	2.60	2,160	4.00	4,100	6.80	9,380
1.30	640	2.70	2,290	4.20	4,400	7.00	9,800
1.40	740	2.80	2,420	4.40	4,710	8.00	12,000
1.50	840	2.90	2,550	4.60	5,040	9.00	14,300
1.60	950	3.00	2,680	4.80	5,390	10.00	16,600
1.70	1,060	3.10	2,810	5.00	5,750	11.00	19,000
1.80	1,180	3.20	2,940	5.20	6,110	12.00	21,400
1.90	1,300	3.30	3,080	5.40	6,490	13.00	23,900
2.00	1,420	3.40	3,220	5.60	6,880	14.00	26,400
2.10	1,540	3.50	3,360	5.80	7,280	15.00	28,900
2.20	1,660	3.60	3,500	6.00	7,700		
2.30	1,780	3.70	3,650	6.20	8,120		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 30 discharge measurements made during 1903 to 1908, and is well defined below gage height 2 feet. Above 2 feet the rating is based on a measurement at 4.36 feet and at the higher stages is only approximate.

Monthly discharge of Catawba River near Morganton, N. C., for 1907 and 1908.

[Drainage area, 758 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January 16–31	1,420	1,060	1,200	1.58	0.94	A.
February	1,480	950	1,150	1.52	1.58	A.
March	2,680	950	1,350	1.78	2.05	A.
April	2,680	895	1,210	1.60	1.78	A.
May	1,600	790	1,090	1.44	1.66	A.
June	14,500	950	2,120	2.80	3.12	B.
July	6,680	690	1,170	1.54	1.78	A.
August	1,300	470	664	.876	1.01	A.
September	16,400	435	1,320	1.74	1.94	A.
October	790	510	585	.772	.89	A.
November	4,400	510	942	1.24	1.38	A.
December 1–21	7,700	690	1,670	2.20	1.72	B.
1908.						
January	17,100	895	2,480	3.27	3.77	B.
February	21,400	950	2,770	3.65	3.94	B.
March	3,950	1,300	2,050	2.70	3.11	B.
April	3,360	950	1,480	1.95	2.18	B.
May	3,430	1,000	1,540	2.03	2.34	B.
June	1,480	840	1,250	1.65	1.84	A.
July	4,100	1,060	1,650	2.18	2.51	B.
August	28,400	1,180	3,950	5.21	6.01	B.
September	3,950	840	2,530	3.34	3.73	B.
October	15,400	740	4,710	6.21	7.16	B.
November	7,700	1,000	2,960	3.91	4.36	B.
December	3,950	1,000	1,480	1.95	2.25	B.
The year	28,400	740	2,400	3.17	43.20	

NOTE.—Discharge interpolated December 25 and 26, 1908.

WATEREE RIVER NEAR CAMDEN, S. C.

This station has been maintained by the United States Weather Bureau since 1891 at the toll bridge about 2 miles west of Camden. Camden is located about 45 miles above the mouth of Wateree River and about 5 miles below the fall line. The United States

Geological Survey has published records of discharge since August 12, 1904. The flood of August, 1908, washed out the bridge and both the United States Geological Survey gage and the United States Weather Bureau gage. A new gage was established September 1, 1908, but records of gage height since that date are withheld, pending the determination of the relation between the original and present gages.

There is some uncertainty regarding the datum to which the gage heights were referred prior to the establishment of the chain gage August, 1904. Conditions of flow are favorable for a good rating and very little shift in river bed has occurred since discharge measurements have been made at this point. Both banks are high, but are liable to overflow at times of extreme floods. The river below has a very small slope, which is unfavorable for good rating at high stages, as the position of the flood crest will greatly affect the slope.[a]

The following discharge measurement was made:

March 14, 1907: Width, 287 feet; area, 3,170 square feet; gage height, 8 feet; discharge, 5,660 second-feet.

Daily gage height, in feet, of Wateree River near Camden, S. C., for 1907 and 1908.

[Observer, H. Arthur Brown.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	14.6	5.95	11.6	5.55	8.6	12.8	11.6	9.2	4.2	9.2	4.05	8.2
2	20.0	6.4	11.7	7.3	7.8	23.8	10.4	7.0	3.65	6.6	4.15	7.9
3	18.0	7.2	10.8	7.0	7.3	25.3	12.6	5.9	4.0	5.95	3.7	6.8
4	13.0	7.6	10.4	6.9	9.6	23.0	10.8	7.3	4.5	5.4	3.75	5.95
5	10.8	15.9	10.7	6.0	8.9	17.5	7.0	5.25	5.85	4.7	4.1	5.6
6	9.4	15.5	10.0	6.0	7.4	12.0	7.4	5.9	5.1	4.2	4.35	5.3
7	8.6	10.8	8.2	5.45	8.6	9.4	5.9	5.25	5.25	3.7	4.65	5.05
8	9.2	9.0	7.5	5.3	7.5	8.0	5.65	4.45	4.1	4.45	4.6	4.55
9	8.5	8.2	7.7	7.9	8.1	7.0	6.4	4.45	3.8	4.55	4.0	4.75
10	8.4	7.3	7.5	7.5	8.9	6.5	5.7	8.6	4.4	4.55	3.45	7.6
11	7.9	6.8	7.0	6.6	8.8	9.4	5.3	8.1	5.35	4.45	4.6	11.7
12	7.8	8.0	7.7	6.2	8.1	13.4	5.55	8.1	7.5	4.35	4.25	10.2
13	7.4	7.6	7.8	5.9	7.2	15.6	6.0	7.0	6.4	3.75	4.2	10.0
14	6.6	6.8	7.8	5.9	7.2	14.7	6.2	5.65	6.4	3.5	4.35	19.0
15	8.2	6.8	8.2	5.1	6.4	12.9	13.3	5.6	5.2	3.8	4.25	27.0
16	7.5	6.6	11.6	6.0	6.2	9.4	13.7	6.4	4.3	3.8	4.05	27.0
17	7.2	6.1	9.8	5.9	6.2	7.6	10.9	6.2	4.5	4.35	3.55	21.2
18	6.5	5.75	8.0	6.2	5.85	7.6	8.4	8.5	4.75	4.45	3.6	14.8
19	6.4	6.8	8.7	7.0	5.55	6.6	7.6	8.4	4.45	4.45	4.65	11.6
20	6.4	7.2	7.6	8.0	4.7	6.4	7.4	7.8	3.8	3.15	5.45	9.4
21	6.2	10.0	7.2	6.4	5.8	6.4	6.2	6.6	3.35	2.55	5.0	7.6
22	6.8	8.8	6.9	6.1	5.5	6.2	5.4	5.75	3.85	3.9	5.95	7.2
23	6.6	7.6	6.7	13.6	5.5	5.6	6.1	6.8	4.9	4.55	19.8	18.6
24	6.5	7.4	5.8	18.4	5.4	5.8	5.2	9.2	8.8	4.25	23.8	28.5
25	6.5	7.8	5.65	15.6	5.6	9.1	5.4	13.4	20.5	4.55	25.0	28.1
26	5.7	10.7	7.1	11.8	5.5	9.2	7.7	9.4	15.2	4.05	21.4	23.0
27	6.4	10.8	6.4	9.6	7.7	7.6	10.0	7.0	9.2	3.25	14.9	16.0
28	4.8	11.0	6.8	9.0	8.6	12.1	9.0	5.45	7.3	3.2	10.2	12.5
29	7.5	.....	6.1	8.4	7.8	15.6	9.4	5.2	13.5	3.75	8.8	10.3
30	6.5	.....	6.1	10.4	6.4	15.5	8.5	4.75	13.7	4.9	10.6	20.8
31	5.4	.....	5.6	.....	6.0	.....	9.0	4.6	.....	4.15	.....	27.2

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Wateree River near Camden, S. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	25.0	17.7	11.2	10.2	8.6	7.9	5.0	10.6	.....	.....	.....	.....
2	20.1	23.4	11.0	9.8	7.6	7.6	6.8	8.5	.....	.....	.....	.....
3	14.8	18.8	10.8	9.5	8.9	7.0	9.6	7.4	.....	.....	.....	.....
4	12.0	13.8	10.6	8.6	8.3	6.4	16.6	6.2	.....	.....	.....	.....
5	14.6	10.2	10.5	8.9	8.2	6.4	17.8	6.7	.....	.....	.....	.....
6	19.5	9.4	10.3	9.4	7.6	7.4	23.0	6.2	.....	.....	.....	.....
7	20.1	9.8	10.4	9.6	7.6	7.6	21.0	7.5	.....	.....	.....	.....
8	27.8	10.0	10.0	9.0	7.4	7.8	17.0	10.0	.....	.....	.....	.....
9	27.6	9.3	10.2	9.6	8.4	7.6	15.2	12.8	.....	.....	.....	.....
10	21.0	9.6	10.4	8.5	10.0	6.8	15.1	13.0	.....	.....	.....	.....
11	16.6	17.8	10.2	8.2	9.1	6.8	15.5	9.4	.....	.....	.....	.....
12	27.4	24.5	10.6	8.1	7.8	6.2	11.3	7.3	.....	.....	.....	.....
13	20.3	26.4	14.9	8.0	7.4	6.8	9.6	6.7	.....	.....	.....	.....
14	28.5	27.0	13.7	8.0	7.4	7.5	8.6	6.4	.....	.....	.....	.....
15	22.9	27.5	10.8	8.0	7.4	8.2	6.9	5.45	.....	.....	.....	.....
16	17.7	28.6	10.2	9.0	6.9	8.8	8.1	5.2	.....	.....	.....	.....
17	14.4	28.7	10.0	10.0	6.7	8.4	7.3	6.2	.....	.....	.....	.....
18	12.3	25.1	9.4	11.4	7.4	8.8	6.2	7.1	.....	.....	.....	.....
19	11.2	20.8	9.0	10.4	7.7	7.8	5.9	6.45	.....	.....	.....	.....
20	11.4	22.8	9.1	10.0	9.4	6.6	6.2	8.85	.....	.....	.....	.....
21	10.8	21.2	16.5	9.6	11.0	6.8	7.3	9.55	.....	.....	.....	.....
22	10.1	16.8	16.8	8.6	11.4	10.8	6.4	12.4	.....	.....	.....	.....
23	9.8	14.0	16.4	8.2	8.8	9.0	8.7	.....	.....	.....	.....	.....
24	9.1	12.8	26.1	8.1	7.8	8.9	9.0	.....	.....	.....	.....	.....
25	8.8	12.0	28.3	7.8	8.3	10.8	10.2	.....	.....	.....	.....	.....
26	8.3	11.6	24.7	7.8	8.5	11.9	8.7	.....	.....	.....	.....	.....
27	9.2	12.0	19.0	9.6	7.8	10.6	9.7	.....	.....	.....	.....	.....
28	11.6	12.3	14.8	10.8	7.4	8.0	9.2	.....	.....	.....	.....	.....
29	11.0	12.4	12.4	10.0	6.9	7.0	7.6	.....	.....	.....	.....	.....
30	9.4	.....	11.4	8.7	7.2	7.2	8.2	.....	.....	.....	.....	.....
31	8.3	.....	11.9	.....	7.0	.....	9.2	.....	.....	.....	.....	.....

NOTE.—Bridge and gage washed away by the flood of August, 1908. Maximum stage reached August 27, 1908, was 38.4 feet, which is the highest recorded since the establishment of this station.

Rating table for Wateree River near Camden, S. C., from September 11, 1904, to August 22, 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.50	650	4.30	2,170	6.20	3,880	13.00	10,420
2.60	730	4.40	2,260	6.40	4,060	14.00	11,420
2.70	810	4.50	2,350	6.60	4,245	15.00	12,420
2.80	890	4.60	2,440	6.80	4,435	16.00	13,520
2.90	970	4.70	2,530	7.00	4,625	17.00	14,620
3.00	1,050	4.80	2,620	7.20	4,815	18.00	15,720
3.10	1,135	4.90	2,710	7.40	5,005	19.00	16,820
3.20	1,220	5.00	2,800	7.60	5,195	20.00	17,920
3.30	1,305	5.10	2,890	7.80	5,385	21.00	19,120
3.40	1,390	5.20	2,980	8.00	5,575	22.00	20,320
3.50	1,475	5.30	3,070	8.20	5,765	23.00	21,520
3.60	1,560	5.40	3,160	8.40	5,955	24.00	22,720
3.70	1,645	5.50	3,250	8.60	6,145	25.00	23,920
3.80	1,730	5.60	3,340	8.80	6,335	26.00	25,220
3.90	1,815	5.70	3,430	9.00	6,525	27.00	26,520
4.00	1,900	5.80	3,520	10.00	7,475	28.00	27,820
4.10	1,990	5.90	3,610	11.00	8,425	29.00	29,120
4.20	2,080	6.00	3,700	12.00	9,420	30.00	30,420

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 15 discharge measurements made during 1904 to 1908 and is well defined between gage heights 3.5 feet and 16 feet.

Monthly discharge of Wateree River near Camden, S. C., for 1907 and 1908.

[Drainage area, 4,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	17,900	2,620	6,050	1.34	1.54	A.
February	13,400	3,480	6,020	1.34	1.40	A.
March	9,120	3,340	5,660	1.26	1.45	A.
April	16,200	2,890	5,530	1.23	1.37	A.
May	7,100	2,530	4,690	1.04	1.20	A.
June	24,300	3,340	9,070	2.02	2.25	A.
July	11,100	2,980	5,650	1.26	1.45	A.
August	10,800	2,300	4,540	1.01	1.16	A.
September	18,500	1,350	4,360	.969	1.08	A.
October	6,720	[a] 690	2,280	.507	.58	A.
November	23,900	1,430	5,530	1.23	1.37	A.
December	28,500	2,400	11,700	2.60	3.00	A.
The year	28,500	[a] 690	5,920	1.32	17.85	
1908.						
January	29,500	5,860	14,200	3.16	3.64	A.
February	28,700	6,810	15,500	3.44	3.71	A.
March	28,200	6,520	10,900	2.42	2.79	A.
April	8,820	5,380	6,630	1.47	1.64	A.
May	8,820	4,340	5,690	1.26	1.45	A.
June	9,320	3,880	5,560	1.24	1.38	A.
July	21,500	2,800	8,160	1.81	2.09	A.

[a] The excessively low discharge for October, 1907, was due to storage above the station and not to natural flow.

MILL CREEK AT OLD FORT, N. C.

The station is located at the footbridge in Old Fort, N. C., a short distance above the mouth of the creek. It was established May 24, 1907, and discontinued December 31, 1907.

The vertical staff gage is located about 500 feet above the footbridge, from which discharge measurements are made. Conditions of flow are probably changeable. An approximate low-water rating has been developed.[a]

Discharge measurements of Mill Creek at Old Fort, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 24	Warren E. Hall	25	27	1.50	[b] 26
May 25	do	45	44	1.52	[c] 33
Do	do	25	28	1.52	[b] 35
July 10	do	25	25	1.50	[b] 28
Do	do	25	26	1.50	[b] 26
September 25	do	25	22	1.44	[b] 21

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

[b] Measurement made at footbridge.

[c] Measurement made at wagon bridge.

Daily gage height, in feet, of Mill Creek at Old Fort, N. C., for 1907.

[Observer, W. A. Thomas.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.6	1.7	1.6	1.1	1.6	1.6	1.6
2	.....	2.4	1.7	1.6	1.1	1.6	1.6	1.8
3	.....	2.4	1.7	1.5	1.1	1.5	1.6	1.6
4	.....	1.2	1.7	1.5	1.1	1.5	1.6	1.6
5	.....	1.8	1.7	1.5	1.1	1.5	1.6	1.6
6	.....	2.2	1.7	1.5	1.1	1.5	1.6	1.5
7	.....	1.6	1.6	1.6	1.7	1.5	1.6	1.5
8	.....	1.6	1.6	1.5	1.4	1.5	1.6	1.5
9	.....	1.7	1.5	1.5	1.2	1.5	1.6	1.5
10	.....	1.7	1.5	1.5	1.1	1.5	1.6	1.4
11	.....	1.8	1.6	1.4	1.1	1.5	1.6	1.4
12	.....	1.8	1.4	1.4	1.1	1.5	1.6	1.4
13	.....	1.7	1.2	1.4	1.0	1.4	1.6	1.4
14	.....	1.7	1.2	1.4	1.0	1.4	1.6	1.8
15	.....	1.7	1.1	1.5	1.0	1.4	1.6	2.2
16	.....	1.7	1.4	1.4	1.0	1.4	1.6	2.0
17	.....	1.7	1.2	1.6	1.0	1.4	1.6	2.0
18	.....	1.7	1.6	1.6	1.0	1.4	1.6	1.8
19	.....	1.7	1.6	1.5	1.0	1.4	1.6	1.6
20	.....	1.7	1.6	1.5	1.0	1.4	1.6	1.6
21	.....	1.7	1.6	1.5	1.0	1.4	1.8	1.5
22	.....	1.7	1.5	1.4	2.2	1.4	1.7	1.4
23	.....	1.7	1.5	1.4	2.0	1.4	1.6	1.4
24	1.5	1.8	1.5	1.4	1.6	1.4	2.1	1.4
25	1.5	1.7	1.7	1.3	1.5	1.8	2.0	1.4
26	1.5	1.7	1.6	1.3	1.4	1.8	1.9	1.4
27	1.5	1.7	1.6	1.3	1.0	1.7	1.8	1.4
28	1.4	1.7	1.6	1.2	1.8	1.7	1.7	2.6
29	1.4	1.7	1.6	1.2	1.7	1.7	1.6	2.4
30	1.4	1.7	1.7	1.2	1.6	1.7	1.6	2.1
31	2.6	.....	1.7	1.1	.....	1.6	.....	1.8

Daily discharge, in second-feet, of Mill Creek at Old Fort, N. C., for 1907.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	44	35	8	35	35	35
2	.....	.....	44	35	8	35	35	55
3	.....	.....	44	27	8	27	35	35
4	.....	11	44	27	8	27	35	35
5	.....	55	44	27	8	27	35	35
6	.....	.....	44	27	8	27	35	27
7	.....	35	35	35	44	27	35	27
8	.....	35	35	27	20	27	35	27
9	.....	44	27	27	11	27	35	27
10	.....	44	27	27	8	27	35	20
11	.....	55	35	20	8	27	35	20
12	.....	55	20	20	8	27	35	20
13	.....	44	11	20	5	20	35	20
14	.....	44	11	20	5	20	35	55
15	.....	44	8	27	5	20	35	.....
16	.....	44	20	20	5	20	35	80
17	.....	44	11	35	5	20	35	80
18	.....	44	35	35	5	20	35	55
19	.....	44	35	27	5	20	35	35
20	.....	44	35	27	5	20	35	35
21	.....	44	35	27	5	20	55	27
22	.....	44	27	20	.....	20	44	20
23	.....	44	27	20	.....	20	35	20
24	27	55	27	20	35	20	.....	20
25	27	44	44	15	27	55	80	20
26	27	44	35	15	20	55	67	20
27	27	44	35	15	5	44	55	20
28	20	44	35	11	55	44	44	.....
29	20	44	35	11	44	44	35	.....
30	20	44	44	11	35	44	35	.....
31	.....	.....	44	8	.....	35	.....	55

NOTE.—Daily discharges are based on a poorly defined rating curve. Beginning with May 24 the discharge was greater than 90 second-feet for all missing days.

LINVILLE RIVER AT FONTA FLORA, N. C.

The station is located at a footbridge one-half mile east of Fonta Flora and about 6 miles above the mouth of the river, which is a tributary of Catawba River. It was established May 20, 1907, and discontinued December 31, 1908.

The vertical staff gage is located about 1,200 feet above the footbridge, where the discharge measurements are made. It was washed out August 27, 1908, and replaced by the observer October 6, 1908. On the basis of discharge comparisons with other stations the gage heights October to December, 1908, appear to be slightly low. Measuring conditions appear to be fairly good, and a fair low-water rating has been developed.[a]

Discharge measurements of Linville River at Fonta Flora, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 21	Warren E. Hall	50	41	1.00	[b] 91
Do	do	50	41	1.00	[b] 91
July 8	do	94	176	1.05	[c] 107
September 26	do	89	90	1.20	[d] 160
September 27	do	84	81	1.13	[d] 136
1908.					
May 15	Warren E. Hall	85	82	1.18	[d] 141
May 16	do	85	82	1.08	[d] 129

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

[b] Measurement made at old bridge.

[c] Measurement made at gage by wading.

[d] Measurement made at new bridge.

Daily gage height, in feet, of Linville River at Fonta Flora, N. C., for 1907 and 1908.

[Observer, W. P. Hemphill.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	4.0	1.1	1.0	0.8	1.1	0.8	1.1
2	.....	.....	.....	.....	.....	2.5	1.1	1.0	.8	1.1	1.0	1.1
3	.....	.....	.....	.....	.....	1.8	1.2	1.0	.8	1.1	1.0	1.1
4	.....	.....	.....	.....	.....	1.5	1.1	.9	.75	1.05	1.0	1.1
5	.....	.....	.....	.....	.....	1.5	1.1	.9	.75	1.05	1.0	1.1
6	.....	.....	.....	.....	.....	1.2	1.1	.9	.8	.9	1.0	1.05
7	.....	.....	.....	.....	.....	1.2	1.1	.9	.8	.9	1.0	1.05
8	.....	.....	.....	.....	.....	1.2	1.05	.9	.8	.9	1.0	1.05
9	.....	.....	.....	.....	.....	1.5	1.05	.9	.8	.9	1.0	1.1
10	.....	.....	.....	.....	.....	1.5	1.0	.9	.8	.85	1.0	1.7
11	.....	.....	.....	.....	.....	1.2	1.0	.9	1.2	.85	1.0	1.6
12	.....	.....	.....	.....	.....	1.2	1.0	.9	1.0	.9	1.0	1.6
13	.....	.....	.....	.....	.....	1.3	1.0	.9	1.0	.9	1.0	1.6
14	.....	.....	.....	.....	.....	1.2	2.5	.9	1.0	.9	1.0	1.7
15	.....	.....	.....	.....	.....	1.2	2.3	.8	.8	.9	1.0	1.6
16	.....	.....	.....	.....	.....	1.1	2.4	.8	.8	.9	1.0	1.55
17	.....	.....	.....	.....	.....	1.1	1.1	.8	.8	.9	1.0	1.5
18	.....	.....	.....	.....	.....	1.1	1.2	1.2	.8	.9	1 05	1.5
19	.....	.....	.....	.....	.....	1.1	1.2	1.1	.8	.9	1.1	1.4
20	.....	.....	.....	.....	1.0	1.0	1.1	1.0	.8	.8	1.1	1.3
21	.....	.....	.....	.....	1.0	1.1	1.15	1.0	.8	.8	1.2	1.2
22	.....	.....	.....	.....	1.0	1.1	1.1	.9	.8	.8	1.25	1.2
23	.....	.....	.....	.....	1.0	1.1	1.1	.9	4.0	.8	1.3	3.0
24	.....	.....	.....	.....	1.0	1.2	1.1	1.2	2.0	.8	1.3	2.5
25	.....	.....	.....	.....	1.0	1.2	1.1	1.0	1.5	.8	1.25	1.7
26	.....	.....	.....	.....	1.1	1.2	1.1	1.0	1.1	.8	1.2	1.5
27	.....	.....	.....	.....	1.1	1.2	1.0	.9	1.1	.85	1.2	1.5
28	.....	.....	.....	.....	1.0	1.5	1.0	.9	1.15	.8	1.15	1.55
29	.....	.....	.....	.....	1.0	1.2	1.0	.9	1.2	.8	1.15	1.55
30	.....	.....	.....	.....	1.0	1.2	1.05	.8	1.1	.8	1.1	1.8
31	.....	.....	.....	.....	1.0	.....	1.0	.8	.....	.8	.....	1.6
1908.												
1	1.5	1.1	1.5	1.3	1.4	1.15	1.2	1.4	.....	.....	1.7	.9
2	1.45	1.1	1.5	1.3	1.3	1.1	1.3	1.3	.....	.....	1.5	.9
3	1.4	1.1	1.5	1.3	1.3	1.1	1.7	1.2	.....	.....	1.4	.9
4	1.3	1.1	1.5	1.3	1.3	1.1	1.7	1.2	.....	.....	1.2	.9
5	1.5	1.1	1.55	1.3	1.3	1.3	1.8	1.3	.....	.....	1.2	.9
6	1.4	1.2	1.6	1.25	1.3	1.2	1.7	1.3	.....	.8	1.2	1.0
7	1.35	1.2	1.6	1.2	1.5	1.1	1.6	1.3	.....	.8	1.15	1.5
8	1.3	1.2	1.55	1.2	1.5	1.1	1.6	1.2	.....	.75	1.1	1.4
9	1.3	1.2	1.5	1.2	1.5	1.1	2.0	1.2	.....	1.1	1.1	1.3
10	1.4	1.3	1.5	1.2	1.4	1.1	1.6	1.2	.....	2.2	1.1	1.2
11	1.5	1.3	1.5	1.2	1.3	1.1	1.5	1.15	.....	1.5	1.05	1.0
12	4.0	2.2	1.5	1.2	1.3	1.3	1.4	1.1	.....	1.2	1.0	1.0
13	2.0	2.5	1.5	1.15	1.25	1.2	1.3	1.1	.....	1.1	1.0	1.0
14	1.7	2.3	1.45	1.15	1.2	1.1	1.3	1.1	.....	1.1	1.0	1.0
15	1.6	5.3	1.35	1.1	1.2	2.0	1.2	1.3	.....	1.1	1.0	1.0
16	1.6	2.0	1.2	1.7	1.15	1.5	1.2	1.1	.....	1.1	1.0	1.0
17	1.5	1.9	1.2	1.5	1.15	1.3	1.1	1.1	.....	1.0	1.0	1.0
18	1.5	1.8	1.2	1.5	1.1	1.1	1.1	1.35	.....	1.05	1.0	1.0
19	1.4	1.6	1.2	1.4	1.4	1.1	1.1	1.15	.....	1.05	1.0	1.0
20	1.3	1.5	1.2	1.35	1.3	1.1	1.1	1.2	.....	1.0	1.0	1.0
21	1.3	1.45	1.3	1.2	1.2	1.7	1.1	1.3	.....	1.0	1.0	1.0
22	1.3	1.4	1.3	1.2	1.2	1.6	1.1	1.2	.....	2.0	1.0	1.5
23	1.3	1.3	1.5	1.15	1.2	1.5	1.1	1.7	.....	7.0	1.0	1.4
24	1.25	1.3	1.5	1.1	1.2	1.4	1.05	1.5	.....	4.0	1.05	1.3
25	1.2	1.3	1.5	3.0	1.2	1.3	1.1	4.5	.....	2.0	1.05	1.2
26	1.15	1.3	1.5	2.0	1.2	1.3	1.1	4.0	.....	1.8	1.0	1.1
27	1.15	1.25	1.45	1.8	1.2	1.2	1.1	.....	.....	1.8	1.0	1.0
28	1.15	1.2	1.4	1.7	1.2	1.2	1.7	.....	.....	1.5	1.0	1.0
29	1.1	1.2	1.3	1.5	1.3	1.15	1.8	.....	.....	2.2	.9	1.0
30	1.1	.....	1.3	1.5	1.2	1.1	1.8	.....	.....	2.0	.9	1.0
31	1.1	.....	1.3	.....	1.2	.....	1.5	.....	.....	1.8	.....	1.0

Daily discharge, in second-feet, of Linville River at Fonta Flora, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	124	96	50	124	50	124
2	.....	.....	.....	.....	.....	.....	124	96	50	124	96	124
3	.....	.....	.....	.....	.....	.....	156	96	50	124	96	124
4	.....	.....	.....	.....	.....	275	124	72	40	110	96	124
5	.....	.....	.....	.....	.....	275	124	72	40	110	96	124
6	.....	.....	.....	.....	.....	156	124	72	50	72	96	110
7	.....	.....	.....	.....	.....	156	124	72	50	72	96	110
8	.....	.....	.....	.....	.....	156	110	72	50	72	96	110
9	.....	.....	.....	.....	.....	275	110	72	50	72	96	124
10	.....	.....	.....	.....	.....	275	96	72	50	61	96	.....
11	.....	.....	.....	.....	.....	156	96	72	156	61	96	.....
12	.....	.....	.....	.....	.....	156	96	72	96	72	96	.....
13	.....	.....	.....	.....	.....	190	96	72	96	72	96	.....
14	.....	.....	.....	.....	.....	156	.....	72	96	72	96	.....
15	.....	.....	.....	.....	.....	156	.....	50	50	72	96	.....
16	.....	.....	.....	.....	.....	124	.....	50	50	72	96	.....
17	.....	.....	.....	.....	.....	124	124	50	50	72	96	275
18	.....	.....	.....	.....	.....	124	156	156	50	72	110	275
19	.....	.....	.....	.....	.....	124	156	124	50	72	124	230
20	.....	.....	.....	.....	96	96	124	96	50	50	124	190
21	.....	.....	.....	.....	96	124	140	96	50	50	156	156
22	.....	.....	.....	.....	96	124	124	72	50	50	173	156
23	.....	.....	.....	.....	96	124	124	72	.....	50	190	.....
24	.....	.....	.....	.....	96	156	124	156	.....	50	190	.....
25	.....	.....	.....	.....	96	156	124	96	275	50	173	.....
26	.....	.....	.....	.....	124	156	124	96	124	50	156	275
27	.....	.....	.....	.....	124	156	96	72	124	61	156	275
28	.....	.....	.....	.....	96	275	96	72	140	50	140	.....
29	.....	.....	.....	.....	96	156	96	72	156	50	140	.....
30	.....	.....	.....	.....	96	156	110	50	124	50	124	.....
31	.....	.....	.....	.....	96	.....	96	50	.....	50	.....	.....
1908.												
1	275	124	275	190	230	140	156	230	.....	.....	.....	72
2	252	124	275	190	190	124	190	190	.....	.....	275	72
3	230	124	275	190	190	124	.....	156	.....	.....	230	72
4	190	124	275	190	190	124	.....	156	.....	.....	156	72
5	275	124	.....	190	190	190	.....	190	.....	.....	156	72
6	230	156	.....	173	190	156	.....	190	.....	50	156	96
7	210	156	.....	156	275	124	.....	190	.....	50	140	275
8	190	156	.....	156	275	124	.....	156	.....	40	124	230
9	190	156	275	156	275	124	.....	156	.....	124	124	190
10	230	190	275	156	230	124	.....	156	.....	.....	124	156
11	275	190	275	156	190	124	275	140	.....	275	110	96
12	.....	.....	275	156	190	190	230	124	.....	156	96	96
13	.....	.....	275	140	173	156	190	124	.....	124	96	96
14	.....	.....	252	140	156	124	190	124	.....	124	96	96
15	.....	.....	210	124	156	.....	156	190	.....	124	96	96
16	.....	.....	156	.....	140	275	156	124	.....	124	96	96
17	275	.....	156	275	140	190	124	124	.....	96	96	96
18	275	.....	156	275	124	124	124	210	.....	110	96	96
19	230	.....	156	230	230	124	124	140	.....	110	96	96
20	190	275	156	210	190	124	124	156	.....	96	96	96
21	190	252	190	156	156	.....	124	190	.....	96	96	96
22	190	230	190	156	156	.....	124	156	.....	.....	96	275
23	190	190	275	140	156	275	124	.....	.....	.....	96	230
24	173	190	275	124	156	230	110	275	.....	.....	110	190
25	156	190	275	.....	156	190	124	.....	.....	.....	110	156
26	140	190	275	.....	156	190	124	.....	.....	.....	96	124
27	140	173	252	.....	156	156	124	.....	.....	.....	96	96
28	140	156	230	.....	156	156	.....	.....	.....	275	96	96
29	124	156	190	275	190	140	.....	.....	.....	.....	72	96
30	124	.....	190	275	156	124	.....	.....	.....	.....	72	96
31	124	.....	190	.....	156	.....	275	.....	.....	.....	.....	96

NOTE.—Daily discharges for 1907 and 1908 are based on a rating curve which is fairly well defined between gage heights 0.9 foot and 1.4 feet. Beginning May 20, 1907, the discharge was greater than 320 second-feet for all missing days, except August 27 to October 5, 1908, when no gage heights were recorded.

JOHNS RIVER AT COLLETTSVILLE, N. C.

The station is located at a footlog, in the town of Collettsville, a short distance above the mouth of Mulberry Creek. It was established May 25, 1907, and was discontinued July 31, 1907. An approximate low-water rating has been developed.[a]

Discharge measurements of Johns River at Collettsville, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 23	Warren E. Hall	51	54	1.00	98
July 9	do	58	64	1.15	114

Daily gage height, in feet, of Johns River at Collettsville, N. C., for 1907.

[Observer, W. T. McLean.]

Day.	May.	June.	July.	Day.	May.	June.	July.	Day.	May.	June.	July.
1		7.5	1.3	12		1.4	1.3	23	1.0	1.4	1.2
2		3.6	1.4	13		1.5	1.4	24	1.0	1.5	1.4
3		2.2	1.4	14		1.5	1.5	25	1.0	1.4	1.3
4		1.8	1.5	15		1.4	1.5	26	1.1	1.3	1.2
5		1.6	1.4	16		1.4	1.6	27	1.2	1.4	1.2
6		1.4	1.4	17		1.4	1.5	28	1.0	1.5	1.2
7		1.3	1.3	18		1.3	1.3	29	1.0	1.7	1.3
8		1.2	1.3	19		1.3	1.5	30	1.0	1.4	1.4
9		2.0	1.2	20		1.3	1.3	31	1.1		1.2
10		1.8	1.2	21		1.4	1.3				
11		1.6	1.2	22		1.3	1.2				

Daily discharge, in second-feet, of Johns River at Collettsville, N. C., for 1907.

Day.	May.	June.	July.	Day.	May.	June.	July.	Day.	May.	June.	July.
1			131	12		144	131	23	98	144	119
2			144	13		158	144	24	98	158	144
3			144	14		158	158	25	98	144	131
4		203	158	15		144	158	26	108	131	119
5		172	144	16		144	172	27	119	144	119
6		144	144	17		144	158	28	98	158	119
7		131	131	18		131	131	29	98	187	131
8		119	131	19		131	158	30	98	144	144
9		238	119	20		131	131	31	108		119
10		203	119	21		144	131				
11		172	119	22		131	119				

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

NOTE.—Daily discharge based on an approximate rating curve. The discharge for missing days from May 23 to July 31 was greater than 250 second-feet.

BROAD RIVER (OF THE CAROLINAS) AT UREE, N. C.

This station is located on the main branch of Broad River, at Uree, about 4 miles above the mouth of Cove Creek and about 3 miles below Buffalo Creek. It was established May 17, 1907.

The datum of the vertical staff gage, which is about 130 feet below the bridge at which the discharge measurements are made, has remained the same since the establishment of the station. Both banks are high and overflow is not liable to occur. The conditions of flow at this station are probably constant, and a good rating has been developed for low stages.[a]

Discharge measurements of Broad River (of the Carolinas) at Uree, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 5	Warren E. Hall	103	113	1.52	127
May 17	do	104	126	1.60	153
September 30	do	101	117	1.43	92
1908.					
May 18	Warren E. Hall	105	154	1.75	195

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Broad River (of the Carolinas) at Uree, N. C., for 1907 and 1908.

[Observer, W. M. Flynn.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.3	1.5	1.6	1.4	1.4	1.3	1.4
2	.....	.....	.....	.....	.....	2.0	1.5	1.5	1.4	1.4	1.6	1.4
3	.....	.....	.....	.....	.....	1.9	1.5	1.4	1.5	1.4	1.4	1.4
4	.....	.....	.....	.....	.....	1.8	1.6	1.4	1.5	1.4	1.4	1.4
5	.....	.....	.....	.....	.....	1.8	1.5	1.4	1.4	1.4	1.4	1.4
6	.....	.....	.....	.....	.....	1.7	1.5	1.4	1.4	1.4	1.4	1.4
7	.....	.....	.....	.....	.....	1.7	1.5	1.4	1.4	1.4	1.35	1.4
8	.....	.....	.....	.....	.....	1.7	1.5	1.4	1.4	1.4	1.35	1.4
9	.....	.....	.....	.....	.....	1.7	1.5	1.5	1.4	1.4	1.35	1.6
10	.....	.....	.....	.....	.....	1.7	1.5	1.5	1.4	1.35	1.4	1.8
11	.....	.....	.....	.....	.....	1.8	1.6	1.6	1.5	1.35	1.4	1.6
12	.....	.....	.....	.....	.....	1.7	1.5	1.5	1.4	1.35	1.4	1.5
13	.....	.....	.....	.....	.....	1.6	1.5	1.6	1.35	1.35	1.4	1.5
14	.....	.....	.....	.....	.....	1.8	1.5	1.5	1.35	1.35	1.4	2.7
15	.....	.....	.....	.....	.....	1.7	1.5	1.4	1.35	1.35	1.4	1.9
16	.....	.....	.....	.....	.....	1.6	1.5	1.4	1.35	1.35	1.4	1.7
17	.....	.....	.....	.....	1.6	1.6	1.5	1.6	1.35	1.35	1.4	1.7
18	.....	.....	.....	.....	1.6	1.6	1.5	1.6	1.35	1.35	1.6	1.6
19	.....	.....	.....	.....	1.6	1.6	1.5	1.6	1.3	1.35	1.6	1.6
20	.....	.....	.....	.....	1.6	1.6	1.5	1.6	1.3	1.35	1.5	1.55
21	.....	.....	.....	.....	1.6	1.6	1.5	1.5	1.3	1.35	1.7	1.5
22	.....	.....	.....	.....	1.5	1.7	1.45	1.5	1.4	1.35	1.5	1.5
23	.....	.....	.....	.....	1.5	1.6	1.45	2.1	3.2	1.35	2.0	2.4
24	.....	.....	.....	.....	1.5	1.7	1.4	1.7	1.6	1.35	1.8	1.9
25	.....	.....	.....	.....	1.6	1.7	1.4	1.5	1.5	1.35	1.6	1.8
26	.....	.....	.....	.....	1.7	1.6	1.4	1.6	1.4	1.35	1.5	1.7
27	.....	.....	.....	.....	1.7	1.6	1.4	1.5	1.4	1.4	1.5	1.7
28	.....	.....	.....	.....	1.6	1.6	1.45	1.4	1.6	1.35	1.5	1.7
29	.....	.....	.....	.....	1.5	1.7	1.4	1.5	1.6	1.35	1.45	1.65
30	.....	.....	.....	.....	1.5	1.6	1.8	1.4	1.45	1.35	1.4	2.2
31	.....	.....	.....	.....	1.6	.....	1.5	1.4	.....	1.35	.....	2.0
1908.												
1	1.8	1.8	1.8	1.8	1.8	1.8	1.6	1.75	2.0	1.7	2.1	1.85
2	1.7	1.8	1.8	1.8	1.75	1.75	1.7	1.7	2.0	1.7	2.1	1.8
3	1.7	1.8	1.8	1.75	1.75	1.8	2.0	1.7	2.0	1.7	2.0	1.8
4	1.7	1.7	1.8	1.75	1.7	1.75	1.8	1.7	2.0	1.7	2.0	1.75
5	1.7	1.6	1.8	1.7	1.7	1.8	2.1	1.7	2.2	1.7	2.0	1.75
6	1.7	1.7	1.8	1.7	1.8	1.8	2.2	2.0	2.0	1.7	2.0	1.75
7	1.8	1.65	1.8	1.7	2.5	1.8	2.0	1.9	2.2	1.7	1.9	2.2
8	1.7	1.65	1.75	1.7	2.0	1.7	1.8	2.9	2.0	1.7	1.9	2.0
9	1.7	1.65	1.8	1.8	1.9	1.7	2.5	2.0	2.0	2.2	1.9	1.85
10	1.6	1.8	1.8	1.8	1.8	1.7	2.1	2.0	1.9	2.4	1.9	1.85
11	3.2	2.0	1.8	1.7	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.85
12	3.4	2.5	1.8	1.7	1.75	1.7	1.8	1.8	1.85	1.9	1.85	1.8
13	2.4	2.45	1.75	1.7	1.7	1.8	1.8	1.8	1.85	1.8	1.85	1.8
14	2.1	2.4	1.75	1.7	1.7	1.75	1.8	1.8	1.85	1.8	2.0	1.8
15	2.0	3.9	1.75	2.1	1.7	1.75	1.75	1.8	1.8	1.75	1.9	1.8
16	1.9	2.4	1.75	1.9	1.7	1.7	1.7	1.8	1.8	1.75	1.85	1.8
17	1.9	2.1	1.7	1.8	1.8	1.7	1.7	2.0	1.8	1.75	1.8	1.8
18	1.8	2.0	1.7	1.8	1.8	1.7	1.7	1.8	1.8	1.7	1.8	1.75
19	1.8	2.0	1.7	1.8	2.1	1.7	1.7	1.75	1.8	1.7	1.8	1.75
20	1.8	1.9	2.0	1.8	1.9	1.7	1.65	1.75	1.8	1.7	1.8	1.75
21	1.7	1.9	1.9	1.75	1.8	1.75	1.65	1.8	1.75	1.7	1.8	1.75
22	1.7	1.9	1.8	1.75	1.8	1.7	1.7	1.8	1.75	2.0	1.8	2.4
23	1.7	1.9	2.1	1.75	1.9	1.75	2.9	2.3	1.75	4.9	1.8	2.0
24	1.6	1.8	2.2	1.7	1.9	1.7	1.8	2.5	1.75	2.8	1.8	1.9
25	1.6	1.8	2.1	2.4	1.8	1.7	1.75	9.2	1.75	2.4	1.8	1.9
26	1.7	1.9	1.9	2.0	1.8	1.65	1.9	4.5	1.7	2.1	1.8	1.9
27	1.7	1.9	1.9	1.9	2.0	1.65	1.9	2.7	1.8	2.0	1.8	1.85
28	1.6	1.9	1.9	1.8	1.8	1.6	2.1	2.4	1.9	2.4	1.8	1.8
29	1.6	1.8	1.85	1.8	1.8	1.6	2.2	2.2	1.8	2.7	1.8	1.8
30	1.6	.....	1.8	1.9	1.9	1.6	1.9	2.2	1.7	2.2	1.8	1.8
31	1.6	.....	1.8	.....	1.8	.....	1.8	2.1	.....	2.2	.....	1.9

Daily discharge, in second-feet, of Broad River (of the Carolinas) at Uree, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	117	149	88	88	62	88
2	.....	.....	.....	.....	.....	302	117	117	88	88	149	88
3	.....	.....	.....	.....	.....	260	117	88	117	88	88	88
4	.....	.....	.....	.....	.....	220	149	88	117	88	88	88
5	.....	.....	.....	.....	.....	220	117	88	88	88	88	88
6	.....	.....	.....	.....	.....	183	117	88	88	88	88	88
7	.....	.....	.....	.....	.....	183	117	88	88	88	75	88
8	.....	.....	.....	.....	.....	183	117	88	88	88	75	88
9	.....	.....	.....	.....	.....	183	117	117	88	88	75	149
10	.....	.....	.....	.....	.....	183	117	117	88	75	88	220
11	.....	.....	.....	.....	.....	220	149	149	117	75	88	149
12	.....	.....	.....	.....	.....	183	117	117	88	75	88	117
13	.....	.....	.....	.....	.....	149	117	149	75	75	88	117
14	.....	.....	.....	.....	.....	220	117	117	75	75	88	.....
15	.....	.....	.....	.....	.....	183	117	88	75	75	88	260
16	.....	.....	.....	.....	.....	149	117	88	75	75	88	183
17	.....	.....	.....	.....	149	149	117	149	75	75	88	183
18	.....	.....	.....	.....	149	149	117	149	75	75	149	149
19	.....	.....	.....	.....	149	149	117	149	62	75	149	149
20	.....	.....	.....	.....	149	149	117	149	62	75	117	133
21	.....	.....	.....	.....	149	149	117	117	62	75	183	117
22	.....	.....	.....	.....	117	183	102	117	88	75	117	117
23	.....	.....	.....	.....	117	149	102	.....	.....	75	302	.....
24	.....	.....	.....	.....	117	183	88	183	149	75	220	260
25	.....	.....	.....	.....	149	183	88	117	117	75	149	220
26	.....	.....	.....	.....	183	149	88	149	88	75	117	183
27	.....	.....	.....	.....	183	149	88	117	88	88	117	183
28	.....	.....	.....	.....	149	149	102	88	149	75	117	183
29	.....	.....	.....	.....	117	183	88	117	149	75	102	166
30	.....	.....	.....	.....	117	149	220	88	102	75	88	.....
31	.....	.....	.....	.....	149	.....	117	88	.....	75	.....	302
1908.												
1	220	220	220	220	220	220	149	202	302	183	.....	240
2	183	220	220	220	202	202	183	183	302	183	.....	220
3	183	220	220	202	202	220	302	183	302	183	302	220
4	183	183	220	202	183	202	220	183	302	183	302	202
5	183	149	220	183	183	220	.....	183	.....	183	302	202
6	183	183	220	183	220	220	.....	302	302	183	302	202
7	220	166	220	183	.....	220	302	260	.....	183	260	.....
8	183	166	202	183	302	183	220	.....	302	183	260	302
9	183	166	220	220	260	183	.....	302	302	.....	260	240
10	149	220	220	220	220	183	.....	302	260	.....	260	240
11	.....	302	220	183	220	220	220	260	260	260	260	240
12	.....	.....	220	183	202	183	220	220	240	260	240	220
13	.....	.....	202	183	183	220	220	220	240	220	240	220
14	.....	.....	202	183	183	202	220	220	240	220	302	220
15	302	.....	202	.....	183	202	202	220	220	202	260	220
16	260	.....	202	260	183	183	183	220	220	202	240	220
17	260	.....	183	220	220	183	183	302	220	202	220	220
18	220	302	183	220	220	183	183	220	220	183	220	202
19	220	302	183	220	.....	183	183	202	220	183	220	202
20	220	260	302	220	260	183	166	202	220	183	220	202
21	183	260	260	202	220	202	166	220	202	183	220	202
22	183	260	220	202	220	183	183	220	202	302	220	.....
23	183	260	.....	202	260	202	.....	.....	202	.....	220	302
24	149	220	.....	183	260	183	220	.....	202	.....	220	260
25	149	220	.....	.....	220	183	202	.....	202	.....	220	260
26	183	260	260	302	220	166	260	.....	183	.....	220	260
27	183	260	260	260	302	166	260	.....	220	302	220	240
28	149	260	260	220	220	149	.....	.....	260	.....	220	220
29	149	220	240	220	220	149	.....	.....	220	.....	220	220
30	149	.....	220	260	260	149	260	.....	183	.....	220	220
31	149	.....	220	.....	220	.....	220	.....	.....	.....	.....	260

NOTE.—Daily discharges for 1907 and 1908 are based on a well-defined rating curve. Beginning May 17, 1907, the discharge was greater than 340 second-feet for all missing days.

BROAD RIVER (OF THE CAROLINAS) AT ALSTON, S. C.

The station was established July 3, 1896, at the Southern Railway bridge at Alston, about 27 miles above Columbia, S. C. It was discontinued December 31, 1907.

The datum of the gage has remained the same during the maintenance of the station. Conditions of flow at this point are poor, owing to the shifting channel and to the great fluctuations in stage caused by water powers above. Both banks are high and do not overflow.[a]

The following discharge measurement was made:

March 13, 1907: Width, 531 feet; area, 2,180 square feet; gage height, 4.00 feet; discharge, 4,470 second-feet.

Daily gage height, in feet, of Broad River (of the Carolinas) at Alston, S. C., for 1907.

[Observer, G. M. Heron.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.4	3.85	5.6	4.1	4.1	8.0	5.4	4.85	1.95	3.6	2.5	4.4
2	9.2	4.25	5.3	4.2	4.0	11.9	4.55	3.55	2.4	3.25	2.45	4.1
3	7.5	4.3	6.0	4.15	4.05	10.6	4.4	3.55	2.3	2.7	2.35	3.55
4	6.6	4.65	5.8	3.95	4.65	6.5	4.55	3.15	2.05	2.25	3.2	3.6
5	5.6	8.8	4.95	3.6	4.55	4.95	4.55	2.95	2.45	2.6	2.45	3.0
6	5.2	7.2	4.55	3.65	4.45	4.55	3.5	2.35	2.5	2.4	2.55	3.0
7	5.1	5.1	4.25	3.6	4.3	4.15	3.3	2.3	3.8	2.65	2.5	2.75
8	5.0	4.9	4.3	3.7	4.35	3.95	3.35	2.9	2.6	2.25	2.35	2.45
9	5.5	4.45	4.15	4.05	4.85	3.8	2.6	2.9	2.55	2.4	2.45	3.7
10	4.25	4.4	4.2	4.0	4.55	3.8	3.0	4.35	2.45	2.6	2.0	4.75
11	4.4	4.45	4.2	3.7	4.75	4.2	2.9	4.85	4.3	2.55	2.7	5.8
12	4.4	4.15	3.95	3.65	4.1	5.0	2.65	3.75	4.1	2.3	2.65	5.6
13	4.1	3.95	4.1	3.25	4.1	4.85	3.0	2.45	3.4	2.45	2.6	4.95
14	4.3	3.9	4.2	3.45	3.95	4.4	3.7	2.7	2.6	1.95	2.6	12.9
15	4.05	3.85	4.6	3.65	4.0	4.45	5.6	4.45	2.05	2.3	2.5	15.6
16	4.2	3.85	5.0	2.85	3.85	3.9	4.1	5.7	2.95	2.55	2.35	11.8
17	4.0	3.7	4.45	3.1	3.7	3.65	3.7	5.9	2.35	2.25	2.3	7.1
18	4.05	3.85	4.65	2.9	3.6	3.2	3.2	4.95	2.15	2.3	2.65	5.8
19	4.0	3.1	4.0	4.4	3.2	3.65	3.95	4.5	2.2	2.35	2.9	5.6
20	3.95	4.4	4.1	5.0	3.45	3.3	3.25	3.95	2.2	2.4	3.65	4.75
21	4.0	5.2	4.0	4.0	2.55	3.2	3.35	3.5	2.05	1.65	3.0	4.35
22	3.85	4.15	3.8	4.3	2.9	3.1	3.05	2.95	1.7	2.25	8.8	4.15
23	3.75	4.05	3.6	10.6	2.5	3.8	2.6	4.4	4.15	2.2	12.4	14.4
24	3.75	3.85	3.7	10.4	2.7	5.0	2.65	5.2	9.0	2.45	.....	19.6
25	3.7	4.7	3.9	7.5	3.4	5.6	2.55	6.1	7.0	2.35	.....	14.6
26	3.75	4.55	3.7	5.4	3.7	4.65	2.4	4.45	4.0	2.3	.....	9.0
27	3.9	5.0	3.95	4.75	4.3	3.8	4.8	3.2	3.05	1.9	5.8	7.1
28	4.1	4.65	3.9	4.45	4.0	7.5	3.35	2.8	3.2	3.1	4.85	5.6
29	3.65	.....	3.45	4.55	3.9	10.6	5.2	2.55	6.0	2.75	4.85	5.2
30	3.65	.....	3.9	4.4	3.25	6.6	5.3	2.45	5.2	2.45	5.4	13.0
31	3.85	.....	3.45	.....	3.7	.....	5.2	2.35	.....	2.45	.....	15.8

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Rating table for Broad River (of the Carolinas) at Alston, S. C., for 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	750	3.20	2,780	4.80	6,430	7.80	15,000
1.70	820	3.30	2,970	4.90	6,690	8.00	15,650
1.80	900	3.40	3,170	5.00	6,950	9.00	18,900
1.90	990	3.50	3,370	5.20	7,490	10.00	22,150
2.00	1,080	3.60	3,580	5.40	8,040	11.00	25,500
2.10	1,180	3.70	3,800	5.60	8,600	12.00	29,000
2.20	1,280	3.80	4,020	5.80	9,160	13.00	32,800
2.30	1,390	3.90	4,240	6.00	9,720	14.00	36,800
2.40	1,510	4.00	4,470	6.20	10,280	15.00	41,400
2.50	1,640	4.10	4,700	6.40	10,860	16.00	46,500
2.60	1,780	4.20	4,940	6.60	11,440	17.00	52,400
2.70	1,930	4.30	5,180	6.80	12,020	18.00	58,800
2.80	2,090	4.40	5,420	7.00	12,600	19.00	65,300
2.90	2,250	4.50	5,670	7.20	13,200	20.00	71,800
3.00	2,420	4.60	5,920	7.40	13,800		
3.10	2,600	4.70	6,170	7.60	14,400		

NOTE.—The above table is not applicable for obstructed channel conditions. It is based on discharge measurements made during 1905 to 1907. It is well defined above gage height 6 feet, but it is not well defined below this stage owing to poor conditions of flow.

Monthly discharge of Broad River (of the Carolinas) at Alston, S. C., for 1907.

[Drainage area, 4,610 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	23,500	3,690	6,610	1.43	1.65	B.
February	18,200	2,600	5,920	1.28	1.33	B.
March	9,720	3,270	5,280	1.15	1.33	B.
April	24,200	2,170	6,060	1.31	1.46	B.
May	6,560	1,640	4,260	.924	1.07	B.
June	28,600	2,600	8,030	1.74	1.94	A.
July	8,600	1,510	4,080	.885	1.02	B.
August	10,000	1,390	4,180	.907	1.05	B.
September	18,900	[a] 820	3,540	.768	.86	B.
October	3,580	[a] 785	1,630	.354	.41	C.
November	30,500	1,080	6,250	1.36	1.52	B.
December	69,200	1,580	15,700	3.41	3.93	A.
The year	69,200	[a] 785	5,960	1.29	17.57	

[a] The excessively low discharge for September and October is due to storage over Sunday at power plants above the gaging station, and hence does not represent natural flow.

NOTE.—Discharge estimated November 24 to 26 on the basis of the discharge at Camden, S. C., and Augusta, Ga.

GREEN RIVER AT SALUDA, N. C.

The station is located at the lower steel bridge about 5 miles southeast of Hendersonville, N. C., and 1 mile above the mouth of Hungry Creek. It was established May 9, 1907, although measurements referred to a bench mark have been previously made at this point.

The datum of the chain gage has remained the same since the establishment of the station. The banks will probably not overflow. Conditions of flow appear to be constant and a good low-water rating has been developed.[a]

Discharge measurements of Green River at Saluda, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 4	Warren E. Hall	45	104	1.85	99
Do	do	45	104	1.85	97
May 9	do	45	104	1.98	128
July 13	do	45	110	1.71	85
Do	F. P. Thomas	45	110	1.70	84
August 17	Warren E. Hall	45	101	1.54	59
Do	do	45	100	1.54	58
September 20	do	45	96	1.40	40
December 10	do	45	171	3.16	506
Do	do	45	168	3.12	486
1908.					
April 11	Warren E. Hall	45	123	2.08	155
July 16	F. P. Thomas	45	112	1.86	105
Do	do	45	113	1.85	101

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Green River at Saluda, N. C., for 1907 and 1908.

[Observer, J. C. Gordon.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.1	1.9	1.5	1.4	1.6	1.4	1.8
2	.....	.....	.....	.....	.....	2.2	1.8	1.5	1.4	1.6	2.1	1.8
3	.....	.....	.....	.....	.....	2.1	1.8	1.5	1.6	1.6	1.8	1.8
4	.....	.....	.....	.....	.....	2.0	1.8	1.5	1.7	1.5	1.6	1.7
5	.....	.....	.....	.....	.....	1.9	1.8	1.5	1.5	1.5	1.6	1.6
6	.....	.....	.....	.....	.....	1.9	1.8	1.5	1.5	1.5	1.6	2.0
7	.....	.....	.....	.....	.....	1.8	1.7	1.5	1.5	1.5	1.5	1.7
8	.....	.....	.....	.....	.....	1.9	1.7	1.6	1.5	2.1	1.5	1.7
9	.....	.....	.....	.....	2.0	1.8	1.7	1.5	1.5	1.6	1.5	2.3
10	.....	.....	.....	.....	1.9	3.2	1.7	1.5	1.5	1.6	1.6	3.8
11	.....	.....	.....	.....	2.0	2.1	1.8	1.5	1.8	1.5	1.6	2.5
12	.....	.....	.....	.....	1.9	2.0	1.7	1.6	1.5	1.5	1.5	2.2
13	.....	.....	.....	.....	1.9	1.9	1.8	1.5	1.4	1.5	1.5	2.1
14	.....	.....	.....	.....	1.9	1.9	1.7	1.6	1.4	1.5	1.5	4.5
15	.....	.....	.....	.....	2.0	1.8	1.7	1.5	1.4	1.5	1.5	3.0
16	.....	.....	.....	.....	1.9	1.8	1.7	1.7	1.5	1.5	1.5	2.6
17	.....	.....	.....	.....	1.8	1.8	1.6	1.6	1.5	1.5	1.5	2.4
18	.....	.....	.....	.....	1.8	1.8	1.7	1.7	1.5	1.5	2.0	2.3
19	.....	.....	.....	.....	1.8	1.8	1.7	1.6	1.4	1.5	1.9	2.2
20	.....	.....	.....	.....	1.8	1.7	1.8	1.6	1.4	1.5	1.8	2.1
21	.....	.....	.....	.....	1.8	1.8	1.6	1.5	1.4	1.5	3.0	2.1
22	.....	.....	.....	.....	1.8	1.9	1.6	1.6	1.4	1.5	2.3	2.1
23	.....	.....	.....	.....	1.8	1.9	1.6	1.7	4.0	1.5	2.4	4.6
24	.....	.....	.....	.....	1.8	1.8	1.5	1.8	2.0	1.5	3.1	2.9
25	.....	.....	.....	.....	1.8	1.8	1.6	1.6	1.7	1.5	2.3	2.6
26	.....	.....	.....	.....	2.5	1.7	1.6	1.5	1.6	1.5	2.1	2.4
27	.....	.....	.....	.....	2.0	1.7	1.6	1.5	1.6	1.5	2.0	2.4
28	.....	.....	.....	.....	1.8	1.8	1.6	1.5	1.7	1.5	1.9	2.3
29	.....	.....	.....	.....	1.8	3.5	1.7	1.5	1.9	1.5	1.9	2.2
30	.....	.....	.....	.....	1.9	2.0	1.7	1.5	1.7	1.5	1.8	3.6
31	.....	.....	.....	.....	1.9	.....	1.6	1.4	.....	1.5	.....	2.7
1908.												
1	2.5	2.4	2.4	2.2	2.3	1.9	1.7	1.8	2.3	1.9	2.3	2.0
2	2.4	2.1	2.4	2.2	2.2	1.9	1.8	1.8	2.3	1.9	2.2	2.0
3	2.3	2.2	2.4	2.2	2.2	2.1	2.2	1.8	2.2	1.8	2.2	1.9
4	2.3	2.1	2.4	2.2	2.2	2.0	2.0	1.7	2.2	1.9	2.2	1.9
5	2.4	2.1	2.3	2.1	2.2	2.6	2.4	2.0	2.6	1.8	2.1	1.9
6	2.3	2.2	2.3	2.2	2.2	2.1	2.4	2.2	2.5	1.8	2.1	2.3
7	2.4	2.2	2.3	2.1	3.1	2.0	2.1	2.0	2.3	1.8	2.1	3.2
8	2.3	2.1	2.2	2.1	2.4	2.0	2.0	1.9	2.2	1.8	2.1	2.6
9	2.2	2.1	2.2	2.1	2.3	1.9	2.3	1.9	2.2	2.0	2.0	2.3
10	2.2	2.2	2.2	2.1	2.2	1.9	2.0	2.0	2.2	2.5	2.0	2.2
11	2.2	2.3	2.2	2.1	2.2	1.9	1.9	1.9	2.1	2.0	2.1	2.2
12	3.8	3.1	2.4	2.0	2.2	1.9	1.9	1.8	2.1	1.9	2.0	2.2
13	2.9	3.4	2.2	2.0	2.1	1.9	1.8	1.7	2.1	1.9	2.0	2.1
14	2.7	3.1	2.2	2.0	2.1	1.9	1.8	1.7	2.1	1.9	2.2	2.1
15	2.6	7.6	2.2	2.9	2.1	2.1	1.8	1.7	2.0	1.9	2.1	2.1
16	2.5	3.6	2.2	2.7	2.1	1.9	2.0	1.7	2.0	1.9	2.0	2.1
17	2.4	3.1	2.1	2.5	2.2	1.9	1.9	2.0	2.0	1.8	2.0	2.1
18	2.4	2.9	2.1	2.4	2.3	1.9	1.8	1.8	2.0	1.8	2.0	2.0
19	2.3	2.7	2.1	2.3	2.2	1.8	1.8	1.8	2.0	1.8	2.0	1.9
20	2.3	2.8	2.3	2.2	2.1	1.8	1.7	2.0	2.0	1.8	2.0	1.6
21	2.3	2.8	2.4	2.2	2.1	1.8	1.7	1.9	2.0	1.8	2.0	2.0
22	2.3	2.6	2.3	2.2	2.1	1.8	1.8	2.5	2.0	1.8	2.0	3.2
23	2.2	2.5	2.5	2.2	2.1	1.8	3.1	2.9	2.0	4.0	2.0	2.5
24	2.1	2.5	3.2	2.1	2.0	1.8	1.9	2.8	1.9	2.8	2.0	2.4
25	2.1	2.5	2.7	3.2	2.0	1.9	1.8	7.4	1.9	2.4	2.0	2.3
26	2.1	2.8	2.5	2.5	2.0	1.8	1.8	4.4	1.9	2.2	2.0	2.2
27	2.3	2.6	2.4	2.4	2.0	1.7	1.8	3.2	2.0	2.0	2.0	2.2
28	2.2	2.5	2.4	2.4	2.0	1.7	1.8	2.8	2.2	2.2	2.0	2.1
29	2.1	2.5	2.3	2.3	2.0	1.7	1.9	2.6	2.0	2.8	1.9	2.1
30	2.1	.....	2.3	2.4	2.0	1.7	2.1	2.5	1.9	2.7	1.8	2.1
31	2.1	.....	2.3	.....	1.9	.....	1.9	2.4	.....	2.4	.....	2.2

Rating table for Green River at Saluda, N. C., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.40	40	2.70	321	4.00	950	5.60	2,110
1.50	52	2.80	357	4.10	1,010	5.80	2,270
1.60	66	2.90	395	4.20	1,070	6.00	2,450
1.70	80	3.00	436	4.30	1,130	6.20	2,630
1.80	96	3.10	480	4.40	1,200	6.40	2,810
1.90	112	3.20	525	4.50	1,270	6.60	2,990
2.00	130	3.30	570	4.60	1,340	6.80	3,170
2.10	151	3.40	620	4.70	1,410	7.00	3,350
2.20	174	3.50	670	4.80	1,480	7.20	3,540
2.30	199	3.60	720	4.90	1,550	7.40	3,730
2.40	226	3.70	775	5.00	1,630	7.60	3,920
2.50	255	3.80	830	5.20	1,790	7.80	4,110
2.60	287	3.90	890	5.40	1,950	8.00	4,300

NOTE.—The above table is not applicable for obstructed channel conditions. It is based on 13 discharge measurements made during 1907 and 1908, and is well defined between gage heights 1.4 feet and 3.2 feet. Above gage height 4.0 feet the rating curve is only approximate.

Monthly discharge of Green River at Saluda, N. C., for 1907 and 1908.

[Drainage area, 51 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 9-31	255	96	114	2.24	1.92	A.
June	670	80	154	3.02	3.37	A.
July	112	52	80.2	1.57	1.81	A.
August	96	40	59.4	1.16	1.34	A.
September	950	40	89.5	1.75	1.95	A.
October	151	52	57.5	1.13	1.30	B.
November	480	40	119	2.33	2.60	A.
December	1,340	66	299	5.86	6.76	A.
1908.						
January	830	151	227	4.45	5.13	A.
February	3,920	151	424	8.31	8.96	B.
March	525	151	213	4.18	4.82	A.
April	525	130	202	3.96	4.42	A.
May	480	112	170	3.33	3.84	A.
June	287	80	116	2.27	2.53	A.
July	480	80	132	2.59	2.99	A.
August	3,730	80	317	6.22	7.17	B.
September	287	112	156	3.06	3.41	A.
October	950	96	174	3.41	3.93	A.
November	199	96	141	2.76	3.08	A.
December	525	66	184	3.61	4.16	A.
The year	3,920	66	205	4.01	54.44	

SECOND BROAD RIVER NEAR LOGANS STORE, N. C.

The station is located about 2 miles south of Logans Store, 6 miles northeast of Rutherfordton, N. C., and about 2 miles above the mouth of Catheys Creek. It was established May 16, 1907, and was discontinued June 30, 1908.

The vertical staff gage is located about 100 yards below the bridge from which discharge measurements are made. Conditions of flow

are probably changeable. An approximate low-water rating has been developed.[a]

Discharge measurements of Second Broad River near Logans Store, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 16	Warren E. Hall	55	63	1.50	111
July 6	do	55	71	1.63	144
September 28	do	52	67	1.57	129
1908.					
May 19	Warren E. Hall	55	75	1.72	133

Daily gage height, in feet, of Second Broad River near Logans Store, N. C., for 1907 and 1908.

[Observer, J. A. Mode.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.								
1	.....	3.6	1.4	1.3	1.2	1.3	1.2	1.4
2	.....	2.7	1.4	1.2	1.2	1.3	1.6	1.4
3	.....	2.3	1.5	1.2	1.4	1.3	1.4	1.3
4	.....	1.9	3.0	1.2	1.3	1.3	1.3	1.3
5	.....	1.7	2.0	1.2	1.2	1.3	1.2	1.3
6	.....	1.6	1.7	1.2	1.2	1.2	1.2	1.3
7	.....	1.6	1.5	1.2	1.2	1.2	1.2	1.3
8	.....	1.7	1.4	1.5	1.3	1.4	1.2	1.3
9	.....	1.6	1.3	1.3	1.3	1.2	1.2	1.6
10	.....	1.6	1.3	1.3	1.2	1.2	1.3	2.6
11	.....	1.8	1.6	1.3	1.7	1.2	1.3	1.8
12	.....	1.5	1.4	1.2	1.2	1.2	1.3	1.6
13	.....	1.5	1.4	1.2	1.2	1.2	1.2	1.5
14	.....	1.7	1.5	1.5	1.2	1.2	1.2	5.6
15	.....	1.5	1.4	1.2	1.2	1.2	1.2	3.3
16	1.5	1.4	1.3	1.3	1.2	1.2	1.2	2.3
17	1.5	1.4	1.3	1.3	1.2	1.2	1.2	1.9
18	1.4	1.4	1.3	1.4	1.2	1.2	1.2	1.8
19	1.4	1.4	1.3	1.3	1.2	1.2	1.4	1.7
20	1.4	1.3	1.3	1.2	1.1	1.2	1.3	1.6
21	1.4	1.5	1.2	1.4	1.1	1.2	2.4	1.6
22	1.4	1.4	1.2	1.4	1.1	1.2	1.8	1.6
23	1.4	1.5	1.2	1.8	2.9	1.2	2.2	9.0
24	1.4	1.6	1.2	1.7	1.9	1.2	3.8	3.3
25	1.4	1.5	1.2	1.4	1.5	1.2	2.1	2.2
26	1.6	1.5	1.2	1.3	1.3	1.2	1.7	1.9
27	2.0	1.4	1.2	1.3	1.3	1.4	1.5	1.7
28	1.5	1.5	1.2	1.2	1.5	1.3	1.5	1.7
29	1.4	1.8	1.2	1.2	1.5	1.2	1.5	1.6
30	1.4	1.6	1.5	1.2	1.3	1.2	1.5	2.9
31	1.5	.....	1.3	1.2	.....	1.2	.....	3.1

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Second Broad River near Logans Store, N. C., etc.—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	2.2	1.7	1.8	1.7	1.7	1.5	17	1.8	2.7	1.6	2.0	1.5	1.5
2	2.0	1.6	1.8	1.7	1.6	1.5	18	1.7	2.3	1.6	1.9	1.5	1.4
3	1.9	1.4	1.7	1.7	1.6	1.4	19	1.7	2.5	1.6	1.8	1.7	1.4
4	1.7	1.3	1.7	1.6	1.6	1.4	20	1.6	2.5	1.9	1.7	1.6	1.4
5	1.9	1.5	1.7	1.6	1.5	1.6	21	1.6	2.2	2.6	1.7	1.6	1.8
6	1.7	1.6	1.7	1.6	1.7	1.5	22	1.5	2.1	2.1	1.6	1.5	1.5
7	2.3	1.8	1.7	1.6	3.3	1.5	23	1.5	1.9	2.4	1.6	1.5	2.0
8	2.5	1.6	1.7	1.6	2.3	1.5	24	1.3	1.8	6.8	1.6	1.6	1.5
9	2.0	1.7	1.7	1.6	1.9	1.4	25	1.3	1.8	2.9	1.8	1.7	1.5
10	1.8	1.7	1.7	1.6	1.8	1.4	26	1.4	2.7	2.3	1.8	1.5	1.5
11	1.8	2.2	1.6	1.5	1.7	1.6	27	1.6	2.3	2.1	1.8	1.5	1.5
12	8.5	4.6	1.8	1.5	1.6	1.5	28	1.5	2.0	1.9	1.7	1.5	1.4
13	3.4	5.1	1.6	1.5	1.6	1.5	29	1.5	1.9	1.8	1.6	1.5	1.4
14	2.4	3.7	1.6	1.5	1.6	1.5	30	1.5	.....	1.8	1.7	1.6	1.3
15	2.0	6.4	1.6	2.7	1.5	2.0	31	1.5	.....	1.7	.....	1.5	.....
16	1.8	3.9	1.6	2.4	1.5	1.5							

Daily discharge, in second-feet, of Second Broad River near Logans Store, N. C., for 1907 and 1908.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.								
1	.....	.....	96	82	70	82	70	96
2	.....	.....	96	70	70	82	126	96
3	.....	.....	110	70	96	82	96	82
4	.....	174	.....	70	82	82	82	82
5	.....	142	190	70	70	82	70	82
6	.....	126	142	70	70	70	70	82
7	.....	126	110	70	70	70	70	82
8	.....	142	96	110	82	96	70	82
9	.....	126	82	82	82	70	70	126
10	.....	126	82	82	70	70	82	.....
11	.....	158	126	82	142	70	82	158
12	.....	110	96	70	70	70	82	126
13	.....	110	96	70	70	70	70	110
14	.....	142	110	110	70	70	70	.....
15	.....	110	96	70	70	70	70	.....
16	110	96	82	82	70	70	70	.....
17	110	96	82	82	70	70	70	174
18	96	96	82	96	70	70	70	158
19	96	96	82	82	70	70	96	142
20	96	82	82	70	60	70	82	126
21	96	110	70	96	60	70	.....	126
22	96	96	70	96	60	70	158	126
23	96	110	70	158	.....	70	.....	.....
24	96	126	70	142	174	70	.....	.....
25	96	110	70	96	110	70	.....	.....
26	126	110	70	82	82	70	142	174
27	190	96	70	82	82	96	110	142
28	110	110	70	70	110	82	110	142
29	96	158	70	70	110	70	110	126
30	96	126	110	70	82	70	110	.....
31	110	.....	82	70	.....	70	.....	.....

Daily discharge, in second-feet, of Second Broad River near Logans Store, N. C., etc.—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	.....	142	158	142	142	110	17	158	.....	126	.....	110	110
2	190	126	158	142	126	110	18	142	.....	126	174	110	96
3	174	96	142	142	126	96	19	142	.....	126	158	142	96
4	142	82	142	126	126	96	20	126	.....	174	142	126	96
5	174	110	142	126	110	126	21	126	.....	.....	142	126	158
6	142	126	142	126	142	110	22	110	.....	.....	126	110	110
7	.....	158	142	126	.....	110	23	110	174	.....	126	110	190
8	.....	126	142	126	.....	110	24	82	158	.....	126	126	110
9	190	142	142	126	174	96	25	82	158	.....	158	142	110
10	158	142	142	126	158	96	26	96	.....	.....	158	110	110
11	158	.....	126	110	142	126	27	126	.....	.....	158	110	110
12	.....	.....	158	110	126	110	28	110	190	174	142	110	96
13	.....	.....	126	110	126	110	29	110	174	158	126	110	96
14	.....	.....	126	110	126	110	30	110	.....	158	142	126	82
15	190	.....	126	.....	110	190	31	110	.....	142	.....	110	.....
16	158	.....	126	.....	110	110							

NOTE.—Daily discharge for 1907 and 1908 based on an approximate rating curve. From May 16, 1907, to June 30, 1908, the discharge was greater than 200 second-feet for all missing days.

MISCELLANEOUS MEASUREMENTS IN SANTEE RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in Santee River drainage basin during 1907:

Measurements in Santee River basin, 1907.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
May 18	Catawba River	Wateree River	Iron wagon bridge, 3 miles from Marion, N. C.	2.40	284
August 8	Linville River	Catawba River	Railroad bridge, ½ mile east of Saginaw, N. C.	1.76	44
May 17	Cove Creek	Broad River	Near mouth of creek, Nanney, N. C.	1.70	108

RIVER SURVEYS IN SANTEE RIVER DRAINAGE BASIN.

In order to point out power possibilities along Catawba River a profile has been prepared showing the fall between Halltown Road ford near Marion, N. C., and Camden, S. C. In connection with the survey, notes showing tributary streams and other natural and artificial features along the river are indicated. Elevations obtained on this survey from Halltown Road crossing near Marion, N. C., to Connelly Springs, N. C., have been published by the United States Geological Survey [a] and are about to be republished by the North Carolina Geological Survey. [b]

[a] Hall, W. C., and Hoyt, J. C., River surveys and profiles made during 1903: Water-Supply Paper U. S. Geol. Survey No. 115, 1905. Separate sheets showing the Catawba and Broad river profiles, and Water-Supply Paper 115, may be obtained on application to the Director of the United States Geological Survey.

[b] Water powers of North Carolina: Bull. North Carolina Geol. Survey (in press).

In order to show the power possibilities along Broad River (of the Carolinas) the United States Geological Survey has published [a] a profile, compiled from data collected by the army engineers, showing the fall of the river between Columbia, S. C., and Green River, N. C.

SAVANNAH RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Savannah River rises on the southern slope of the Blue Ridge Mountains in the northeast corner of Georgia and the northwest corner of South Carolina, with some of its headwaters coming across the state line from North Carolina. Its general course is southeast, and it forms the boundary between Georgia and South Carolina from North Carolina to the Atlantic Ocean. The basin is about 260 miles long and contains about 11,100 square miles of area.

The principal tributaries are Tallulah, Seneca, and Broad rivers. Tugaloo River is the name given the main stream above the mouth of Seneca, and in turn it becomes Chattooga River above the mouth of Tallulah.

A small portion of the upper end of the basin has an elevation of 3,000 feet and even more, but the fall is very rapid down to about 1,000 feet.

Above the fall line, which passes a few miles above Augusta, Ga., the main streams and many smaller tributaries are excellent water-power streams, having a good amount of fall and a large minimum flow.

The average annual rainfall reaches 70 inches in the extreme upper portion and from 50 inches to 60 inches in the other parts.

The following gaging stations have been maintained in this river basin: [b]

Chattooga River, Clayton, Ga., 1907–8.
Tugaloo River, Toccoa, Ga., 1907–8.
Tugaloo River, Madison, S. C., 1898–1908.
Savannah River, Calhoun Falls, S. C., 1896–1903.
Savannah River, Woodlawn, S. C., 1905–1908.
Savannah River, Augusta, Ga., 1899–1906.
Stekoa Creek, Clayton, Ga., 1907–8.
Tallulah River, Tallulah Falls, Ga., 1900–1908.
Chauga River, Madison, S. C., 1907.
Seneca River, Clemson College, S. C., 1903–1905.
Broad River (of Georgia), Carlton, Ga., 1897–1908.

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[a] Hall, W. C., and Hoyt, J. C., River surveys and profiles made during 1903: Water-Supply Paper U. S. Geol. Survey No. 115, 1905. Separate sheets showing the Catawba and Broad river profiles, and Water-Supply Paper 115, may be obtained on application to the Director of the United States Geological Survey.

[b] Data collected in this drainage basin prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

CHATTOOGA RIVER NEAR CLAYTON, GA.

The station is located at an iron wagon bridge 9 miles southeast of Clayton at a point known as Rogues Ford. It is 2½ miles above Stekoa Creek. It was established May 13, 1907, and was discontinued June 30, 1908.

The vertical staff gage is located 50 feet above the bridge from which discharge measurements are made. The bed of the stream is rock and very rough, and the current is badly broken, so that accurate discharge measurements can not be made. An approximate rating has been developed for low stages.

Discharge measurements of Chattooga River near Clayton, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 13	F. A. Murray	143	284	1.86	568
June 14	do	140	266	1.68	551
July 19	do	140	254	1.61	517
Do	B. M. Hall, jr	142	258	1.61	518
August 30	F. A. Murray	128	184	1.20	287
November 11	do	139	242	1.59	500
1908.					
May 21	M. R. Hall	144	235	1.82	578

Daily gage height, in feet, of Chattooga River near Clayton, Ga., for 1907 and 1908.

[Observer, Bieman Phillips.]

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.								
1	.....	2.3	1.5	1.3	1.2	1.4	1.1	1.6
2	.....	2.1	1.4	1.3	1.2	1.3	1.3	1.5
3	.....	1.9	1.8	1.3	1.2	1.3	1.7	1.5
4	.....	1.8	1.7	1.3	1.3	1.3	1.3	1.5
5	.....	1.7	1.5	1.3	1.3	1.3	1.3	1.5
6	.....	1.6	1.5	1.3	1.2	1.2	1.2	1.4
7	.....	1.6	1.5	1.3	1.2	1.2	1.2	1.4
8	.....	1.7	1.4	1.3	1.2	1.6	1.2	1.4
9	.....	1.8	1.4	1.2	1.2	1.4	1.2	1.6
10	.....	1.7	1.4	1.2	1.2	1.3	1.3	3.2
11	.....	1.6	1.4	1.2	1.2	1.2	1.6	2.1
12	.....	1.6	1.4	1.3	1.2	1.2	1.4	1.9
13	2.25	1.6	1.5	1.3	1.2	1.2	1.3	1.7
14	1.8	1.7	1.5	1.4	1.2	1.2	1.3	3.2
15	1.7	1.6	1.6	1.3	1.2	1.2	1.2	2.4
16	1.8	1.5	1.7	1.3	1.2	1.2	1.2	2.2
17	1.8	1.5	1.6	1.3	1.2	1.2	1.2	1.9
18	1.7	1.5	1.5	1.5	1.2	1.2	1.4	1.9
19	1.7	1.5	1.7	1.6	1.2	1.2	1.7	1.9
20	1.7	1.5	1.5	1.5	1.2	1.2	1.5	1.8
21	1.6	1.5	1.4	1.5	1.2	1.2	2.8	1.7
22	1.6	1.5	1.4	1.4	1.2	1.2	2.1	1.7
23	1.6	1.5	1.3	1.9	4.1	1.2	2.1	4.2
24	1.6	1.6	1.3	1.5	1.8	1.1	3.1	1.7
25	1.6	1.9	1.4	1.5	1.4	1.1	2.3	2.3
26	1.7	1.7	1.3	1.3	1.3	1.1	2.0	2.0
27	1.8	1.6	1.3	1.3	1.3	1.2	1.8	2.0
28	1.6	1.7	1.3	1.2	1.3	1.3	1.8	2.0
29	1.6	1.7	1.4	1.2	1.9	1.2	1.7	2.0
30	1.6	1.5	1.6	1.2	1.5	1.2	1.6	2.3
31	1.8	.....	1.4	1.2	.....	1.1	.....	2.8

Daily gage height, in feet, of Chattooga River near Clayton, Ga., etc.—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	2.4	2.5	2.2	2.1	2.2	1.8	17	2.2	2.9	1.9	2.3	1.9	1.8
2	2.3	2.3	2.2	2.1	2.2	1.7	18	2.1	2.7	1.9	2.2	1.9	1.8
3	2.2	2.0	2.2	2.0	2.1	1.7	19	2.1	2.7	1.8	2.2	2.2	1.7
4	2.1	2.0	2.1	2.0	2.1	1.7	20	2.1	2.6	2.0	2.1	1.9	1.7
5	2.5	2.0	2.1	2.0	2.0	1.9	21	2.0	2.5	2.5	2.0	1.8	1.7
6	2.3	2.1	2.1	2.0	2.0	1.8	22	2.0	2.4	2.2	2.0	1.8	1.7
7	2.1	2.0	2.1	2.0	2.9	1.7	23	2.0	2.3	2.9	2.0	1.8	1.7
8	2.1	2.0	2.0	2.0	2.2	1.7	24	1.9	2.3	3.8	2.0	1.9	1.7
9	2.0	2.0	2.0	2.0	2.1	1.7	25	1.9	2.2	2.6	5.2	1.9	1.7
10	1.9	2.0	2.0	1.9	2.1	1.7	26	1.9	2.5	2.5	2.7	1.8	1.6
11	1.9	2.4	2.0	1.9	2.1	2.1	27	2.2	2.3	2.2	2.6	2.1	1.6
12	3.7	2.7	2.2	1.9	2.1	1.8	28	2.0	2.2	2.3	2.4	2.0	1.6
13	2.9	2.7	2.0	1.8	2.0	1.7	29	1.9	2.2	2.3	2.3	1.9	1.6
14	2.5	2.8	2.0	1.8	1.9	2.1	30	1.9	.....	2.2	2.3	1.9	1.5
15	2.3	7.3	2.0	2.4	1.9	2.2	31	1.8	.....	2.1	.....	1.8	.....
16	2.3	3.3	2.0	2.7	1.9	1.8							

Rating table for Chattooga River near Clayton, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.10	245	1.70	535	2.30	910	2.90	1,350
1.20	290	1.80	590	2.40	980	3.00	1,430
1.30	335	1.90	650	2.50	1,050	4.00	2,330
1.40	380	2.00	715	2.60	1,120	5.00	3,330
1.50	430	2.10	780	2.70	1,190	6.00	4,430
1.60	480	2.20	845	2.80	1,270	7.00	5,630

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on seven discharge measurements made during 1907-8 and is not well defined.

Monthly discharge of Chattooga River near Clayton, Ga., for 1907 and 1908.

[Drainage area, 205 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 13-31	878	480	544	2.65	1.87	A.
June	910	430	521	2.54	2.83	A.
July	590	335	417	2.03	2.34	A.
August	650	290	358	1.75	2.02	A.
September	2,430	290	398	1.94	2.16	B.
October	480	245	305	1.49	1.72	A.
November	1,510	245	506	2.47	2.76	B.
December	2,530	380	780	3.80	4.38	C.
1908.						
January	2,040	590	840	4.10	4.73	C.
February	6,000	715	1,150	5.61	6.05	C.
March	2,130	590	860	4.20	4.84	C.
April	3,550	590	892	4.35	4.85	C.
May	1,350	590	726	3.54	4.08	B.
June	845	430	566	2.76	3.08	A.

TUGALOO RIVER NEAR TOCCOA, GA.

The station is located at Prathers Bridge, 6 miles east of Toccoa, Ga., 8 miles above the Madison (S. C.) station and 4 miles below the mouth of Panther Creek. It was established May 10, 1907, and was discontinued January 31, 1908.

The datum of the chain gage has remained constant since the establishment of the station. The bed of the stream is sandy and liable to shift. An approximate low-water rating has been developed.

Discharge measurements of Tugaloo River near Toccoa, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 10	F. A. Murray	153	570	3.96	1,340
July 20	do	152	495	3.37	1,100
Do	B. M. Hall, jr	152	487	3.37	1,120
November 7	F. A. Murray	139	340	2.42	614

Daily gage height, in feet, of Tugaloo River near Toccoa, Ga., for 1907 and 1908.

[Observer, Mrs. Dora Smith.]

Day.	1907.								Jan., 1908.
	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
1	.....	5.1	3.0	2.8	2.3	2.8	2.2	3.2	5.9
2	.....	4.7	2.9	2.6	2.2	2.7	2.7	3.2	5.3
3	.....	4.1	2.95	2.8	2.2	2.6	3.9	3.1	4.9
4	.....	3.85	5.0	2.5	2.8	2.6	2.8	3.0	4.7
5	.....	3.65	3.25	2.5	3.3	2.6	2.5	2.9	6.9
6	.....	3.45	3.0	2.5	2.5	2.5	2.5	2.9	5.5
7	.....	3.35	2.9	2.6	2.4	2.5	2.4	2.9	5.2
8	.....	3.35	2.8	2.5	2.4	2.9	2.3	2.8	4.9
9	.....	4.3	2.95	2.5	2.4	2.8	2.3	3.4	4.5
10	3.95	3.75	2.65	2.5	2.5	2.5	2.6	7.5	4.4
11	4.1	3.5	2.65	2.5	2.5	2.5	3.7	5.2	4.3
12	4.15	3.6	2.65	3.9	2.4	2.4	2.9	4.3	12.5
13	3.85	3.35	4.0	2.8	2.3	2.3	2.8	3.8	7.5
14	3.8	3.55	3.0	2.7	2.2	2.3	2.6	7.0	6.3
15	3.85	3.25	3.8	2.7	2.2	2.3	2.5	5.8	5.6
16	4.35	3.15	4.4	3.7	2.3	2.3	2.5	4.9	5.4
17	3.85	3.1	3.4	3.7	2.3	2.3	2.4	4.4	5.2
18	3.7	3.5	4.1	3.2	2.2	2.3	2.8	4.1	5.0
19	3.6	3.4	3.2	2.9	2.2	2.3	3.9	4.0	4.8
20	3.55	3.2	3.4	2.9	2.1	2.2	3.1	3.8	4.7
21	3.5	3.5	3.1	2.9	2.1	2.2	6.3	3.7	4.6
22	3.4	3.1	2.8	3.1	2.1	2.2	5.2	3.5	4.5
23	3.4	3.15	2.8	3.1	10.8	2.2	3.0	*11.8	4.4
24	3.35	3.35	2.6	2.8	4.3	2.2	9.3	6.8	4.2
25	3.4	3.1	2.6	2.5	3.2	2.2	5.6	5.5	4.2
26	3.35	3.2	2.7	2.4	2.6	2.2	4.5	4.9	4.1
27	3.9	3.0	2.7	2.4	2.6	2.4	4.0	4.5	5.1
28	3.3	3.5	2.8	2.4	2.9	2.7	3.7	4.5	4.4
29	3.35	5.1	2.8	2.3	4.5	2.3	3.6	4.3	4.4
30	3.2	3.4	4.9	2.3	3.5	2.5	3.4	8.0	4.1
31	3.35	.....	3.1	2.3	.....	2.2	.....	7.5	4.0

Rating table for Tugaloo River near Toccoa, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.10	479	3.50	1,140	4.90	1,990	7.60	4,150
2.20	521	3.60	1,195	5.00	2,060	7.80	4,340
2.30	564	3.70	1,250	5.20	2,200	8.00	4,540
2.40	608	3.80	1,305	5.40	2,350	8.20	4,740
2.50	653	3.90	1,360	5.60	2,500	8.40	4,940
2.60	699	4.00	1,420	5.80	2,650	8.60	5,140
2.70	745	4.10	1,480	6.00	2,800	8.80	5,340
2.80	792	4.20	1,540	6.20	2,950	9.00	5,550
2.90	839	4.30	1,600	6.40	3,110	10.00	6,620
3.00	887	4.40	1,665	6.60	3,270	11.00	7,730
3.10	935	4.50	1,730	6.80	3,430	12.00	8,880
3.20	985	4.60	1,795	7.00	3,600	13.00	10,080
3.30	1,035	4.70	1,860	7.20	3,780		
3.40	1,085	4.80	1,925	7.40	3,960		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on four discharge measurements made during 1907 and 1908 and on the rating curve for Tugaloo River near Madison, S. C. It is fairly well defined.

Monthly discharge of Tugaloo River near Toccoa, Ga., for 1907 and 1908.

[Drainage area, 535 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 10-31	1,630	985	1,220	2.28	1.87	A.
June	2,130	887	1,200	2.24	2.50	A.
July	2,060	699	1,000	1.87	2.16	A.
August	1,360	564	775	1.45	1.67	B.
September	7,500	479	941	1.76	1.96	B.
October	792	521	618	1.16	1.34	B.
November	5,860	521	1,230	2.30	2.57	B.
December	8,650	792	2,060	3.85	4.44	A
1908.						
January	9,480	1,420	2,310	4.32	4.98	A

TUGALOO RIVER NEAR MADISON, S. C.

The station was originally established at Cooks Ferry, July 19, 1898, and was discontinued December 31, 1901, when the ferry was moved. It was reestablished July 7, 1903, at Holcombs Ferry, 1 mile west of Madison, S. C., and 900 feet below the Southern Railway bridge. It is about 1½ miles above the point where the old station was located and 2 miles below the mouth of Toccoa Creek.

The datum of both gages has remained constant during the period of their maintenance. There is, however, no established relation between the two gage zeros. The elevation of the datum of the present gage is 630.10 feet above sea level. It consists of a vertical timber in three sections, and is located within a few feet of the ferry landing. Discharge measurements are made from the ferryboat or from a small boat held in place by a cable stretched across the river.

Both banks are moderately high, but will overflow for about 200 feet on each side at extreme high stages. The bed of the river is sandy and changeable, necessitating frequent changes in ratings. The high-water part of the rating curve has not yet been developed.[a]

Discharge measurements of Tugaloo River near Madison, S. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 9	F. A. Murray	158	628	4.02	1,500
July 20	do	156	488	3.03	1,010
November 6	do	156	340	2.20	623
1908.					
December 16	W. A. Lamb	160	562	3.57	1,240
December 17	do	160	555	3.50	1,160

[a] Data collected at this station prior to 1906 have been published in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Tugaloo River near Madison, S. C., for 1907 and 1908.

[Observer, T. A. Spencer.]

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	10.1	4.0	4.4	3.9	4.2	4.8	2.8	2.6	2.0	2.8	1.95	3.0
2	6.7	6.4	8.3	3.4	3.8	4.8	2.7	2.4	1.95	2.6	2.3	2.95
3	6.1	4.7	6.1	3.3	3.7	4.0	2.8	2.85	1.95	2.5	4.0	3.0
4	5.8	4.8	5.0	3.3	4.4	4.1	5.9	2.3	2.7	2.4	2.7	2.85
5	5.4	6.1	4.6	3.25	4.1	3.4	3.2	2.2	2.75	2.3	2.3	2.75
6	5.2	5.1	4.3	4.4	3.8	3.3	2.9	2.25	2.3	2.3	2.2	2.7
7	5.1	4.6	4.1	4.0	4.3	3.2	2.7	2.35	2.1	2.2	2.15	2.7
8	4.9	4.8	4.4	3.65	4.3	3.2	2.65	2.2	2.05	2.45	2.1	2.7
9	4.8	4.3	4.1	3.6	4.0	4.2	3.1	2.2	2.1	2.7	2.1	3.2
10	4.8	4.1	4.5	3.4	3.85	3.5	2.5	2.15	2.1	2.3	2.3	6.6
11	4.65	4.0	4.35	3.35	3.9	3.35	2.45	2.15	2.2	2.2	3.9	5.3
12	4.6	3.9	4.0	3.4	4.0	3.8	2.5	3.0	2.2	2.15	2.7	4.1
13	4.5	4.3	3.95	3.3	3.7	3.15	3.5	2.5	2.0	2.1	2.7	3.6
14	4.4	3.85	3.9	3.2	4.35	3.5	3.0	2.45	1.95	2.1	2.4	6.4
15	4.9	3.75	4.2	3.15	3.65	3.15	2.9	2.35	1.9	2.1	2.3	5.9
16	4.3	3.7	3.9	3.2	4.0	3.0	3.9	2.85	2.3	2.1	2.2	4.8
17	4.25	3.65	3.8	3.4	3.8	2.95	3.0	2.65	1.95	2.1	2.2	4.2
18	4.2	3.6	3.8	3.7	3.6	2.9	3.05	2.8	2.0	2.1	2.5	3.9
19	4.2	3.9	3.7	4.6	3.5	3.25	4.4	3.75	1.9	2.05	3.6	3.8
20	4.25	3.7	3.7	3.5	3.4	3.05	3.5	2.75	1.85	2.05	2.9	3.6
21	4.3	3.6	3.6	3.3	3.5	2.95	3.15	2.6	1.85	2.0	6.6	3.5
22	4.6	3.5	3.55	3.25	3.25	3.1	2.65	2.7	1.9	2.0	5.2	3.3
23	4.1	3.45	3.5	8.2	3.25	3.3	2.55	3.1	9.3	2.0	4.7	10.7
24	3.95	3.4	3.5	5.1	3.2	3.25	2.45	2.95	4.6	2.0	11.1	7.1
25	3.9	4.1	3.45	4.5	3.3	3.05	2.4	2.45	3.0	2.0	5.8	5.4
26	4.0	3.8	3.6	4.2	3.2	3.1	2.5	2.3	2.6	2.0	4.5	4.8
27	3.95	4.5	3.5	4.25	4.0	2.9	2.4	2.2	2.4	2.15	3.9	4.4
28	3.9	4.05	3.45	4.2	3.3	3.7	2.5	2.15	2.5	2.5	3.5	4.3
29	3.95	.....	3.4	4.1	3.9	4.4	2.7	2.2	4.1	2.15	3.4	4.2
30	3.8	.....	3.35	4.1	3.1	3.4	5.4	2.1	3.3	2.7	3.2	10.2
31	3.75	.....	3.4	.....	3.3	.....	3.0	2.0	.....	2.0	.....	7.9
1908.												
1	6.0	6.5	4.9	5.0	6.0	3.85	3.05	2.95	3.6	2.4	3.4	2.75
2	5.3	5.8	4.9	4.9	5.0	3.75	3.05	2.85	3.1	2.4	3.25	4.1
3	4.9	4.85	5.0	4.8	5.5	3.75	4.25	2.75	3.1	2.3	3.1	3.3
4	4.5	4.5	4.8	4.7	5.2	3.85	3.75	2.85	3.0	2.3	3.3	3.0
5	6.8	4.3	4.8	4.6	5.0	4.0	7.0	2.8	3.1	2.3	3.2	3.0
6	5.5	4.6	4.7	5.2	5.0	4.3	5.8	3.25	5.5	2.3	3.15	3.0
7	5.2	4.5	4.7	4.8	7.6	3.8	6.0	3.75	3.8	2.5	2.9	14.1
8	4.8	4.4	4.5	4.6	5.9	3.7	5.0	3.05	3.4	2.25	3.0	8.2
9	4.5	4.3	4.45	4.5	5.3	3.55	5.2	3.45	3.2	2.4	3.0	5.5
10	4.2	4.5	4.4	4.5	5.1	4.4	5.8	3.65	3.1	6.9	2.8	4.7
11	4.1	8.5	4.35	4.3	4.9	3.85	4.65	3.0	3.1	3.3	2.8	4.1
12	11.7	7.9	5.1	4.3	4.8	3.75	4.25	2.85	2.9	2.8	3.4	4.3
13	7.7	7.6	4.7	4.2	4.6	3.75	3.95	2.75	2.85	2.6	2.9	4.0
14	6.3	7.6	4.5	4.2	4.5	4.5	3.85	2.7	2.8	2.5	3.05	3.8
15	5.5	18.4	4.4	8.1	4.5	5.5	3.75	2.65	2.8	2.5	3.3	3.7
16	5.4	10.5	4.4	8.2	4.5	4.2	3.65	2.65	2.7	2.4	3.2	3.6
17	5.2	8.2	4.3	6.8	4.4	3.75	3.5	3.05	2.7	2.4	2.9	3.7
18	4.9	7.1	4.2	5.7	4.5	3.75	3.35	3.25	2.7	2.35	2.9	3.5
19	4.7	7.2	4.15	6.0	5.3	3.65	3.35	2.8	2.65	2.35	2.8	3.4
20	4.6	6.9	4.4	5.5	4.8	3.55	3.25	4.25	2.85	2.3	2.8	3.3
21	4.4	6.3	7.7	5.1	4.4	3.6	3.15	3.05	2.6	2.35	2.8	3.5
22	4.4	6.0	5.3	4.9	4.2	4.3	3.15	5.0	2.55	2.35	2.7	5.7
23	4.3	5.7	9.7	4.8	4.2	3.65	3.05	6.4	2.55	3.8	2.7	7.0
24	4.1	5.4	17.9	4.6	4.4	3.6	3.2	8.8	2.5	5.5	2.85	5.1
25	4.05	5.4	8.2	12.0	4.1	3.55	3.25	12.4	2.4	3.6	2.8	4.4
26	4.0	5.8	6.8	9.6	4.1	3.45	3.15	6.6	2.4	3.2	2.8	4.3
27	5.0	5.6	6.1	7.4	4.7	3.25	3.1	4.85	2.45	3.1	2.9	4.0
28	4.25	5.5	5.7	6.6	4.3	3.15	2.95	4.25	2.8	2.9	2.8	3.9
29	4.2	5.1	5.5	6.0	4.1	3.1	3.05	3.85	2.9	5.1	2.85	3.8
30	4.0	.....	5.3	5.7	4.6	3.1	3.25	3.65	2.8	4.7	2.8	3.7
31	3.9	.....	5.2	.....	4.0	.....	3.05	3.55	.....	4.5	.....	4.2

Rating tables for Tugaloo River near Madison, S. C.

JANUARY 1, 1907, TO FEBRUARY 14, 1908.[a]

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.80	465	3.20	1,105	4.60	2,125	7.00	4,340
1.90	500	3.30	1,165	4.70	2,210	8.00	5,340
2.00	535	3.40	1,225	4.80	2,295	9.00	6,340
2.10	575	3.50	1,290	4.90	2,380	10.00	7,340
2.20	615	3.60	1,355	5.00	2,465	11.00	8,340
2.30	655	3.70	1,425	5.20	2,640	12.00	9,340
2.40	700	3.80	1,495	5.40	2,820	13.00	10,340
2.50	745	3.90	1,570	5.60	3,000	14.00	11,340
2.60	790	4.00	1,645	5.80	3,180	15.00	12,340
2.70	840	4.10	1,720	6.00	3,365	16.00	13,340
2.80	890	4.20	1,800	6.20	3,555	17.00	14,340
2.90	940	4.30	1,880	6.40	3,745	18.00	15,340
3.00	995	4.40	1,960	6.60	3,940	19.00	16,340
3.10	1,050	4.50	2,040	6.80	4,140		

FEBRUARY 15, TO DECEMBER 31, 1908.[b]

2.20	540	3.30	1,065	4.40	1,820	5.50	2,840
2.30	580	3.40	1,125	4.50	1,905	5.60	2,940
2.40	620	3.50	1,185	4.60	1,990	5.70	3,040
2.50	660	3.60	1,245	4.70	2,080	5.80	3,140
2.60	700	3.70	1,310	4.80	2,175	5.90	3,240
2.70	745	3.80	1,375	4.90	2,270	6.00	3,340
2.80	795	3.90	1,440	5.00	2,365	6.20	3,540
2.90	845	4.00	1,510	5.10	2,460	6.40	3,740
3.00	900	4.10	1,585	5.20	2,555		
3.10	955	4.20	1,660	5.30	2,650		
3.20	1,010	4.30	1,740	5.40	2,745		

Monthly discharge of Tugaloo River near Madison, S. C., for 1907 and 1908.

[Drainage area, 593 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	7,440	1,460	2,300	3.88	4.47	B.
February	3,740	1,220	1,830	3.09	3.22	B.
March	5,640	1,200	1,770	2.98	3.44	B.
April	5,540	1,080	1,600	2.70	3.01	B.
May	1,960	1,050	1,460	2.46	2.84	B.
June	2,300	940	1,290	2.18	2.43	B.
July	3,270	700	1,090	1.84	2.12	B.
August	1,460	535	757	1.28	1.48	B.
September	6,640	482	918	1.55	1.73	B.
October	890	535	631	1.06	1.22	B.
November	8,440	518	1,460	2.46	2.74	B.
December	8,040	840	2,330	3.93	4.53	B.
The year	8,440	482	1,450	2.45	33.23	
1908.						
January	9,040	1,570	2,610	4.40	5.07	B.
February	15,700	1,880	3,910	6.59	7.11	B.
March	15,200	1,620	3,030	5.11	5.89	B.
April	9,340	1,660	3,090	5.21	5.81	B.
May	4,940	1,510	2,240	3.78	4.36	B.
June	2,840	955	1,400	2.36	2.63	B.
July	4,340	872	1,550	2.61	3.01	B.
August	9,740	722	1,730	2.92	3.37	B.
September	2,840	620	911	1.54	1.72	B.
October	4,240	560	1,050	1.77	2.04	B.
November	1,120	745	886	1.49	1.66	B.
December	11,400	770	2,040	3.44	3.97	B.
The year	15,700	560	2,040	3.44	46.64	

[a] The above table is not applicable for obstructed-channel conditions. It is based on two discharge measurements made during 1907 and the form of earlier rating curves. It is not well defined. Above gage height 6.5 feet, the rating curve is a tangent, the difference being 100 per tenth.

[b] The above table is not applicable for obstructed-channel conditions. It is based on two discharge measurements made during 1908 and the form of earlier rating curves. It is not well defined. Above gage height, 6.4 feet, this table is the same as the table for 1907.

SAVANNAH RIVER AT WOODLAWN, S. C.

The station is located at the Charleston and Western Carolina Railway bridge, 1,000 feet from the depot at Woodlawn, S. C., 17 miles above Augusta, Ga., and 10 miles above the Augusta water-power dam. It is 5 miles above Stevens Creek, which is a large tributary from the South Carolina side. It was established November 9, 1905, and has been maintained continuously except from August 27, to October 12, 1908, when the gage was destroyed by a flood which washed out the two main spans of the east-channel bridge.

The original gage was of the standard chain type attached to the railroad bridge. The present temporary staff gage, used since October 12, 1908, consists of three vertical sections attached to trees from 50 to 80 feet above the bridge. The datum of both gages is the same and has not changed since their installation.

Both banks overflow slightly at extreme high stages. An island which divides the channel into two sections also overflows at high stages, the overflow passing through about 900 feet of wooden trestle. The bed of the stream is composed mainly of rock and is quite rough, causing broken and irregular current in some portions of the cross section. Conditions of flow appear to be constant and an excellent rating has been developed for low and medium low stages.

Discharge measurements of Savannah River at Woodlawn, S. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 12	M. R. Hall	688	3,190	5.39	8,770
1908.					
July 9	M. R. Hall	604	5.240	8.74	23,200

Daily gage height, in feet, of Savannah River at Woodlawn, S. C., for 1907 and 1908.

[Observers, W. E. Stanfield and J. C. Parks.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	10.8	5.3	6.7	4.75	5.2	6.6	5.4	5.1	3.3	5.5	3.4	5.9
2	10.0	6.4	7.8	5.0	5.1	7.8	4.5	4.4	3.1	4.45	3.5	4.85
3	7.6	6.8	9.7	4.9	5.0	7.0	5.6	4.15	3.1	4.1	3.5	4.8
4	6.6	10.8	8.5	4.7	5.1	5.5	6.4	4.75	3.45	4.05	4.1	4.8
5	6.3	11.7	6.8	4.5	5.55	5.1	5.0	4.6	4.2	3.8	3.3	4.5
6	6.0	11.1	6.1	4.5	5.2	4.8	4.8	3.85	4.5	3.7	3.45	4.4
7	5.8	8.5	5.8	5.25	5.0	4.6	4.25	3.65	4.15	3.6	4.0	4.3
8	5.7	6.7	5.6	5.4	5.1	4.5	4.0	3.9	3.7	3.65	3.9	4.25
9	5.6	6.0	5.5	5.0	5.5	4.5	3.95	3.65	3.5	3.85	3.9	4.25
10	5.5	5.8	5.45	5.1	5.5	4.65	3.85	3.7	3.55	3.8	3.65	4.45
11	5.45	5.6	5.3	5.0	5.2	4.9	3.85	4.15	4.1	3.8	3.7	4.6
12	5.4	5.5	5.35	5.0	5.1	5.0	4.3	5.3	4.1	3.55	4.5	5.4
13	5.3	5.4	5.25	4.8	5.1	4.9	4.8	4.4	3.9	3.5	4.45	7.8
14	5.3	5.25	5.1	4.8	4.55	4.75	5.2	4.1	3.7	3.4	4.5	11.6
15	5.3	5.2	5.3	4.6	4.6	4.6	5.5	4.05	3.5	3.6	4.3	12.1
16	5.2	5.15	5.45	4.4	4.7	4.4	5.0	4.1	3.25	3.3	3.8	8.8
17	5.2	5.05	5.3	4.5	4.7	4.3	5.4	4.3	3.25	3.4	3.8	6.8
18	5.15	5.0	5.2	4.7	4.8	4.15	5.3	5.0	3.45	3.3	3.95	6.0
19	5.1	5.0	5.15	4.6	4.7	4.1	5.15	5.7	3.2	3.4	4.3	5.65
20	5.2	5.2	5.1	5.3	4.55	4.0	5.0	5.0	3.3	3.45	4.75	5.45
21	5.2	5.4	5.0	5.45	4.4	4.3	4.85	4.7	3.15	3.3	5.15	5.2
22	5.2	5.3	4.9	5.3	4.3	4.1	4.5	4.2	3.1	3.3	9.2	5.0
23	5.1	5.05	4.85	8.3	4.3	4.0	4.05	4.05	4.25	3.25	11.8	14.3
24	5.0	4.95	4.8	10.7	4.3	4.3	3.8	4.2	9.4	3.4	11.8	16.3
25	5.0	5.2	4.75	8.2	4.4	4.4	3.8	4.2	7.8	3.5	9.6	11.8
26	5.0	5.7	4.75	6.7	4.5	4.55	3.7	3.85	5.0	3.2	7.8	8.6
27	5.1	6.3	4.7	6.1	5.2	4.5	4.0	3.7	4.2	3.2	6.2	6.7
28	5.1	6.5	4.7	5.8	5.4	4.45	4.0	3.5	4.2	3.2	5.2	5.95
29	5.0	.....	4.65	5.7	5.35	8.3	5.4	3.7	8.0	3.25	5.5	6.1
30	4.9	.....	4.65	5.05	4.5	6.7	5.25	3.5	6.5	3.3	6.3	11.6
31	4.95	.....	4.55	.....	4.5	.....	5.6	3.4	.....	3.55	.....	15.7
1908.												
1	13.2	14.3	6.0	6.4	6.8	5.25	5.7	4.5	.....	.....	8.1	4.7
2	9.7	14.5	6.2	6.4	6.4	5.15	4.6	4.4	.....	.....	6.4	4.9
3	7.2	10.8	6.3	6.4	6.3	4.85	5.6	4.3	.....	.....	6.5	5.1
4	6.4	8.4	5.75	6.5	6.2	4.7	7.8	4.2	.....	.....	7.8	5.0
5	7.0	6.5	5.45	6.2	5.85	5.3	10.1	4.1	.....	.....	7.0	4.8
6	8.4	6.5	5.3	6.2	5.8	5.6	8.1	5.3	.....	.....	6.0	4.6
7	10.7	6.4	5.25	6.5	5.9	5.55	7.2	9.1	.....	.....	5.6	4.65
8	12.3	6.2	5.15	6.3	6.3	5.25	7.0	8.1	.....	.....	5.3	9.4
9	9.8	6.0	5.35	6.2	6.5	5.0	8.4	7.2	.....	.....	4.9	8.0
10	7.5	6.0	5.5	6.0	5.9	4.8	7.6	7.7	.....	.....	4.7	6.8
11	7.7	12.5	5.5	5.8	5.5	4.9	6.9	7.0	.....	.....	4.45	6.2
12	13.8	13.6	5.6	5.7	5.5	5.2	6.1	6.3	.....	.....	4.35	6.7
13	14.6	11.7	5.7	5.75	5.45	5.4	5.5	5.6	.....	4.8	5.7	7.2
14	10.6	10.6	5.6	5.8	5.5	5.5	5.45	4.85	.....	4.4	7.8	6.1
15	8.0	10.6	5.5	6.1	5.4	5.4	5.3	4.5	.....	4.4	7.0	5.35
16	7.0	14.5	5.5	9.4	5.35	5.5	5.15	4.35	.....	4.25	6.5	5.1
17	6.6	13.0	5.3	12.9	5.2	5.5	5.0	4.2	.....	4.2	6.3	5.0
18	6.4	9.1	5.4	12.0	5.05	5.6	4.8	4.2	.....	4.2	6.1	5.0
19	6.0	8.0	5.3	9.9	5.7	8.4	5.0	4.75	.....	4.2	5.9	5.0
20	6.0	8.4	5.4	7.8	6.3	9.9	5.1	6.5	.....	4.2	5.6	4.9
21	5.7	8.4	6.9	8.4	6.4	8.0	4.95	8.0	.....	4.1	5.2	5.0
22	5.7	8.1	7.9	7.8	5.6	6.8	4.7	7.6	.....	4.1	4.9	8.1
23	5.55	7.6	10.5	6.8	5.3	7.7	4.7	7.7	.....	4.2	4.7	14.9
24	5.5	6.8	15.8	6.6	5.3	9.1	4.5	9.6	.....	4.35	4.6	13.2
25	5.4	6.6	17.7	7.4	5.2	10.0	4.25	16.0	.....	7.0	4.5	9.2
26	5.35	6.4	13.3	10.8	5.1	8.1	4.2	35.8	.....	5.3	4.45	7.4
27	5.4	6.3	9.8	12.3	5.1	7.4	4.4	.....	.....	5.1	4.5	6.8
28	5.6	6.4	8.4	11.0	5.05	7.0	4.5	.....	.....	5.45	4.55	5.95
29	5.85	6.4	7.4	9.1	5.1	6.8	4.4	.....	.....	7.0	4.6	5.7
30	5.55	.....	6.8	7.5	5.6	6.3	4.5	.....	.....	10.8	4.6	5.6
31	6.1	.....	6.7	.....	5.3	.....	4.6	.....	.....	9.6	.....	5.8

NOTE.—The gage was washed out August 27 and was replaced to the same datum October 13, 1908. August 27, 1908, the stage reached 37.6 feet, as determined afterwards by leveling to high-water marks. This is the highest stage recorded since the establishment of this station.

Rating table for Savannah River at Woodlawn, S. C., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.10	2,640	5.20	8,170	7.60	17,420	19.00	84,360
3.20	2,850	5.30	8,490	7.80	18,350	20.00	90,560
3.30	3,060	5.40	8,820	8.00	19,310	21.00	96,760
3.40	3,280	5.50	9,150	8.20	20,300	22.00	102,960
3.50	3,500	5.60	9,490	8.40	21,310	23.00	109,160
3.60	3,730	5.70	9,830	8.60	22,350	24.00	115,360
3.70	3,960	5.80	10,180	8.80	23,410	25.00	121,560
3.80	4,200	5.90	10,530	9.00	24,490	26.00	127,760
3.90	4,450	6.00	10,890	9.20	25,590	27.00	133,960
4.00	4,700	6.10	11,250	9.40	26,700	28.00	140,160
4.10	4,960	6.20	11,620	9.60	27,820	29.00	146,360
4.20	5,220	6.30	11,990	9.80	28,940	30.00	152,560
4.30	5,490	6.40	12,370	10.00	30,060	31.00	158,760
4.40	5,760	6.50	12,760	11.00	35,760	32.00	164,960
4.50	6,040	6.60	13,150	12.00	41,560	33.00	171,160
4.60	6,330	6.70	13,550	13.00	47,460	34.00	177,360
4.70	6,630	6.80	13,950	14.00	53,460	35.00	183,560
4.80	6,930	6.90	14,360	15.00	59,560	36.00	189,760
4.90	7,230	7.00	14,780	16.00	65,760		
5.00	7,540	7.20	15,630	17.00	71,960		
5.10	7,850	7.40	16,510	18.00	78,160		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 10 discharge measurements made during 1905–1908, and is well defined between gage heights 3 feet and 10 feet. Above gage height 15 feet the rating curve is a tangent, the difference being 620 per tenth. The upper part of the curve is based on a discharge of 200,000 second-feet at gage height 37.6 feet, which was the crest stage of the flood of August, 1908. The estimate of the crest discharge at Woodlawn is based on the corresponding discharge at Augusta, Ga., which was estimated to be 216,000 second-feet, with a possible error of 10 to 15 per cent.

Monthly discharge of Savannah River at Woodlawn, S. C., for 1907 and 1908.

[Drainage area, 6,600 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	34,600	7,230	10,500	1.59	1.83	A.
February	39,800	7,380	12,900	1.95	2.03	A.
March	28,400	6,180	9,780	1.48	1.71	A.
April	34,000	5,760	9,550	1.45	1.62	A.
May	9,320	5,490	7,220	1.09	1.26	A.
June	20,800	4,700	7,840	1.19	1.33	A.
July	12,400	3,960	6,810	1.03	1.19	A.
August	9,830	3,280	5,370	.814	.94	A.
September	26,700	2,640	6,070	.920	1.03	A.
October	9,150	2,850	3,790	.574	.66	A.
November	40,400	3,060	9,780	1.48	1.65	A.
December	67,600	5,360	18,900	2.86	3.30	B.
The year	67,600	2,640	9,040	1.37	18.55	
1908.						
January	57,100	8,660	19,700	2.98	3.44	B.
February	56,500	10,900	25,700	3.89	4.20	B.
March	76,300	8,010	17,300	2.62	3.02	B.
April	46,900	9,830	19,100	2.89	3.22	B.
May	14,000	7,700	9,820	1.49	1.72	A.
June	30,100	6,630	12,800	1.94	2.16	A.
July	30,600	5,220	10,300	1.56	1.80	A.
August[a]	189,000	4,960	26,300	3.98	4.59	B.
September	33,400	6,500	10,400	1.58	1.76	B.
October	34,600	4,960	8,920	1.35	1.56	A.
November	19,800	5,620	9,890	1.50	1.67	A.
December	59,000	6,330	14,200	2.15	2.48	A.
The year	189,000	4,960	15,400	2.33	31.62	

[a] For estimated discharge at the crest of the flood, August, 1908, see rating table, footnote above.

NOTE.—The discharge August 27 to October 12, 1908, was obtained from the application of the 1906 rating for Savannah River at Augusta, Ga., to the corresponding gage heights at that point. Suitable coefficients were applied to the Augusta discharge to obtain the true discharge at Woodlawn.

SAVANNAH RIVER AT AUGUSTA, GA.

Owing to the control of the discharge of Savannah River at Augusta, Ga., by users of water power, the daily gage readings are not a correct index of the true discharge. The errors from this source are greatest at low and medium stages. This station was discontinued December 31, 1906.[a] (See Savannah River at Woodlawn, S. C.)

For view of dam and head of canal on Savannah River near Augusta, Ga., see Plate III, *A*.

STEKOA CREEK NEAR CLAYTON, GA.

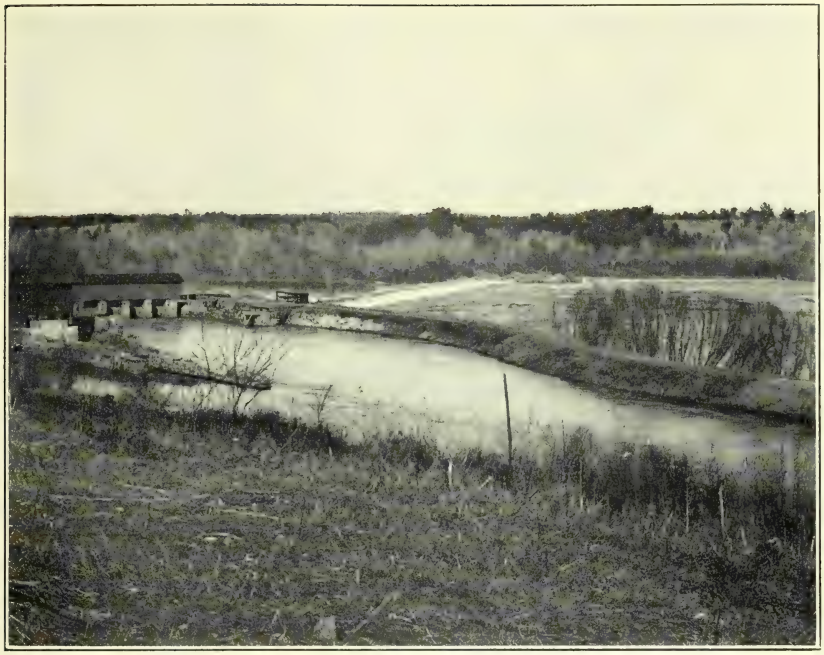
This station is located 9 miles southeast of Clayton, at a foot log one-fourth mile from B. F. Phillip's house and 2 miles above the mouth of the creek. It was established May 14, 1907, and was discontinued June 30, 1908.

The vertical staff gage is located 6 feet above the foot log. The bed of the stream is soft and sandy and liable to shift. A fairly good low-water rating has been developed.

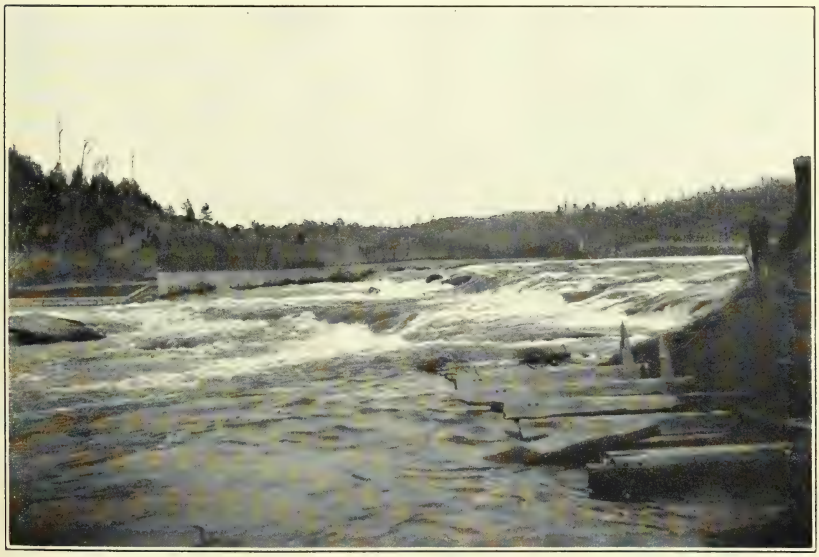
Discharge measurements of Stekoa Creek near Clayton, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 14	F. A. Murray	52	67	1.07	90
June 14	do	52	59	1.03	76
July 19	B. M. Hall, jr	52	66	1.02	80
November 11	F. A. Murray	52	55	.96	68
1908.					
May 21	M. R. Hall	50	75	1.25	124
Do	do	50	75	1.24	128

[a] All data collected at this station from 1899 to 1905, inclusive, and low-water discharge from 1892 to 1905, inclusive, have been compiled in Water-Supply Paper No. 197, Water resources of Georgia. For gage heights after 1906 the reader is referred to the United States Weather Bureau, Washington, D. C.



A. DAM AND HEAD OF CANAL, SAVANNAH RIVER, AUGUSTA, GA.



B. CHATTAHOOCHEE RIVER NEAR FRANKLIN, GA.

Daily gage height, in feet, of Stekoa Creek near Clayton, Ga., for 1907 and 1908.

[Observer, B. F. Phillips.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						2.0	1.0	1.0	0.9	1.0	0.8	1.0
2						1.2	1.0	1.0	.9	.9	1.8	1.0
3						1.1	1.0	.9	.9	.9	1.0	.95
4						1.1	1.1	.9	.9	.9	1.0	.9
5						1.1	1.0	.9	.9	.9	.9	.9
6						1.0	1.0	.9	.9	.9	.9	.9
7						1.0	1.0	.9	.9	.9	.9	.9
8						1.1	1.0	.9	.9	.9	.9	.9
9						1.1	.9	.9	.9	.9	.9	1.1
10						1.1	.9	.9	.9	.9	1.15	1.7
11						1.0	.9	.9	1.0	.9	1.0	1.2
12						1.0	.9	.9	.9	.9	.9	1.1
13						1.0	1.1	.9	.9	.9	.9	1.1
14					1.1	1.1	1.0	.9	.9	.9	.9	2.0
15					1.2	1.0	1.0	.9	.9	.9	.9	1.4
16					1.1	1.0	1.0	1.1	.9	.9	.9	1.2
17					1.1	1.0	1.0	1.0	.9	.9	.9	1.2
18					1.1	1.0	1.0	1.1	.9	.9	1.2	1.1
19					1.1	1.0	1.9	1.1	.8	.9	1.0	1.1
20					1.0	1.0	1.1	1.0	.8	.9	.9	1.1
21					1.0	1.0	1.1	1.0	.8	.9	2.8	1.0
22					1.0	1.0	1.0	1.0	.8	.9	1.4	1.0
23					1.0	1.0	1.0	1.0	4.2	.9	3.0	2.5
24					1.0	1.0	1.0	1.0	1.1	.9	1.9	1.4
25					1.0	1.0	.9	1.0	1.0	.9	1.4	1.3
26					1.1	1.0	.9	.9	1.0	.9	1.1	1.2
27					1.1	1.0	.9	.9	.9	1.0	1.1	1.2
28					1.1	1.1	1.2	.9	1.2	.9	1.1	1.2
29					1.0	1.2	1.0	.9	1.2	.9	1.1	1.2
30					1.0	1.0	1.4	.9	1.0	.9	1.1	4.7
31					1.2		1.1	.9		.8		1.7
1908.												
1	1.4	1.7	1.3	1.3	1.4	1.2						
2	1.3	1.3	1.3	1.3	1.4	1.2						
3	1.3	1.2	1.3	1.3	1.4	1.2						
4	1.2	1.2	1.3	1.3	1.3	1.2						
5	1.5	1.2	1.3	1.2	1.3	1.5						
6	1.3	1.2	1.3	1.3	1.3	1.3						
7	1.3	1.2	1.3	1.3	1.8	1.2						
8	1.3	1.2	1.2	1.3	1.4	1.1						
9	1.2	1.2	1.2	1.2	1.4	1.1						
10	1.2	1.4	1.2	1.2	1.4	1.1						
11	1.2	1.9	1.2	1.2	1.3	1.1						
12	3.4	1.7	1.3	1.2	1.3	1.1						
13	1.7	1.6	1.2	1.2	1.3	1.1						
14	1.4	1.6	1.2	1.2	1.3	1.5						
15	1.4	4.9	1.2	2.7	1.2	1.4						
16	1.3	2.0	1.2	1.7	1.2	1.3						
17	1.3	1.7	1.2	1.6	1.2	1.2						
18	1.3	1.5	1.2	1.6	1.2	1.2						
19	1.2	1.6	1.2	1.5	1.4	1.1						
20	1.2	1.5	1.4	1.4	1.3	1.1						
21	1.2	1.5	1.5	1.3	1.3	1.1						
22	1.2	1.4	1.4	1.3	1.3	1.1						
23	1.2	1.4	3.5	1.3	1.2	1.1						
24	1.2	1.4	4.0	1.3	1.2	1.1						
25	1.2	1.3	1.8	7.5	1.2	1.1						
26	1.2	1.5	1.5	2.0	1.3	1.1						
27	1.3	1.4	1.4	1.7	1.3	1.1						
28	1.2	1.3	1.4	1.6	1.2	1.1						
29	1.2	1.3	1.4	1.5	1.2	1.0						
30	1.2		1.3	1.5	1.2	1.0						
31	1.2		1.3		1.2							

Rating table for Stekoa Creek near Clayton, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	45	1.50	187	2.20	410	2.90	655
.90	60	1.60	215	2.30	445	3.00	690
1.00	77	1.70	245	2.40	480	4.00	1,090
1.10	95	1.80	276	2.50	515	5.00	1,490
1.20	115	1.90	308	2.60	550	6.00	1,890
1.30	137	2.00	340	2.70	585	7.00	2,290
1.40	161	2.10	375	2.80	620		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 6 discharge measurements made during 1907 and 1908, and is well defined between gage heights 0.8 foot and 1.5 feet. It is only roughly approximate at high stages. Above gage height 3 feet the rating curve is a tangent, the difference being 40 per tenth.

Monthly discharge of Stekoa Creek near Clayton, Ga., for 1907 and 1908.

[Drainage area, 36 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 14–31	115	77	89.2	2.48	1.66	B.
June	340	77	93.1	2.59	2.89	B.
July	308	60	87.5	2.43	2.80	B.
August	95	60	68.3	1.90	2.19	B.
September	1,170	45	102	2.83	3.16	C.
October	77	45	60.6	1.68	1.94	B.
November	690	45	133	3.69	4.12	C.
December	1,370	60	169	4.69	5.41	D.
1908.						
January	850	115	156	4.33	4.99	C.
February	1,450	115	220	6.11	6.59	D.
March	1,090	115	196	5.44	6.27	D.
April	2,490	115	253	7.03	7.84	D.
May	276	115	139	3.86	4.45	B.
June	187	77	110	3.06	3.41	B.

TALLULAH RIVER AT TALLULAH FALLS, GA.

This station is located at the wagon bridge about one-fourth mile above the falls and about one-fourth mile from the village of Tallulah Falls. It was established August 29, 1900, but the record for that year extended only to October 19, when the observer moved away. Readings were resumed January 18, 1901, and were again discontinued December 31, 1901. On July 15, 1904, the station was reestablished and has continued without any break since that time.

The original gage established in 1900 is still in place and other gages which have superseded it have all been set to agree with the original datum. The present gage is of the standard chain type.

Both banks are high and not subject to overflow. The bed of the stream is rough and composed of rocks. Conditions of flow have changed slightly since the establishment of the station, but a good rating has been developed for low stages.[a]

Discharge measurements of Tallulah River at Tallulah Falls, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 6	F. A. Murray	62	433	2.02	642
Do	do	62	433	2.02	646
May 11	do	60	398	2.04	708
July 17	do	60	348	1.34	354
Do	B. M. Hall, jr	60	360	1.34	340
November 11	F. A. Murray	59	380	1.30	318
November 12	do	59	376	1.22	303
Do	do	59	376	1.23	300
1908.					
May 20	M. R. Hall	62	430	2.18	708
Do	do	62	430	2.16	721
December 18	Wm. A. Lamb	58	409	1.63	431

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Tallulah River at Tallulah Falls, Ga., for 1907 and 1908.

[Observer, A. I. McKay.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.3	2.2	2.0	1.7	1.9	1.6	1.2	1.9	0.8	1.4	0.9	1.3
2	2.8	2.6	3.7	1.5	1.8	1.6	1.2	1.7	.9	1.3	1.0	1.2
3	2.6	2.4	2.9	1.5	1.8	1.6	1.3	1.4	1.0	1.2	1.0	1.2
4	2.5	2.1	2.2	1.5	2.1	1.7	2.3	1.0	1.2	1.1	1.0	1.2
5	2.4	2.1	2.2	1.5	2.1	1.7	1.8	.9	1.4	1.1	1.0	1.1
6	2.4	2.0	2.1	1.7	2.0	1.5	1.2	.9	1.0	1.0	1.0	1.0
7	2.3	2.0	2.0	1.7	2.1	1.4	1.2	.8	.8	1.0	1.0	1.2
8	2.3	2.0	2.0	1.7	2.0	1.4	1.2	.7	.8	1.7	1.0	1.6
9	2.2	2.0	2.0	1.7	2.0	1.6	1.2	.7	.9	1.6	1.0	1.8
10	2.2	2.0	2.0	1.6	1.8	1.5	1.2	.6	.9	1.4	1.0	3.1
11	2.2	1.9	1.7	1.5	1.8	1.5	1.2	.6	.9	1.2	.9	3.0
12	2.1	1.9	2.0	1.5	1.8	1.5	1.2	.5	.9	1.0	.9	2.9
13	2.1	1.9	2.0	1.6	1.8	1.5	2.1	.4	.8	1.0	.9	2.9
14	2.1	1.8	1.9	1.5	1.9	1.6	1.9	1.0	.8	1.0	.9	3.3
15	2.0	1.8	2.0	1.5	1.9	1.4	1.4	1.0	.8	1.0	.8	2.1
16	2.0	1.8	1.9	1.5	1.9	1.3	1.6	1.0	.9	.9	.8	2.0
17	2.0	1.8	1.9	1.6	2.0	1.3	1.6	1.6	.8	.9	1.0	2.0
18	2.0	1.8	1.7	1.5	1.8	1.3	1.5	1.6	.8	.8	1.9	2.0
19	2.0	1.7	1.7	1.5	1.8	1.3	2.0	1.2	.7	.8	2.0	1.9
20	2.0	1.7	1.7	1.5	1.8	1.3	1.8	1.2	.7	.8	2.5	1.7
21	1.9	1.7	1.7	1.5	1.7	1.3	1.7	1.1	.7	.8	3.3	1.7
22	1.9	1.7	1.6	1.6	1.7	1.3	1.7	1.3	.8	.8	2.2	2.0
23	1.9	1.6	1.6	2.6	1.6	1.3	1.4	1.2	2.8	.8	2.3	4.2
24	1.9	1.7	1.6	2.8	1.6	1.5	1.3	1.2	1.9	.8	3.0	2.3
25	1.9	1.8	1.5	2.2	1.6	1.3	1.2	1.2	1.4	.8	2.3	2.5
26	1.9	1.9	1.5	1.9	1.8	1.4	1.2	1.2	1.2	.8	1.8	2.3
27	1.9	2.1	1.5	1.8	1.7	1.4	1.0	1.1	1.1	.8	1.6	2.1
28	1.9	2.1	1.5	1.9	1.6	1.3	2.2	1.0	1.4	.8	1.4	2.0
29	1.9	.....	1.5	1.9	1.5	2.2	2.0	.9	2.1	.8	1.3	2.6
30	1.8	.....	1.5	1.9	1.4	1.5	2.5	.9	1.5	.8	1.1	3.6
31	1.8	.....	1.5	.....	1.6	.....	2.0	.8	.....	1.0	.....	3.0
1908.												
1	2.9	2.9	2.5	2.2	2.5	2.0	1.4	1.3	1.5	1.0	1.4	2.0
2	2.4	2.8	2.3	2.3	2.5	2.0	1.4	1.2	1.3	1.0	1.4	2.0
3	2.4	2.8	2.3	2.2	2.5	2.0	1.5	1.1	1.3	1.0	1.4	2.0
4	2.1	2.6	2.3	2.2	2.4	2.1	1.6	1.1	1.3	1.0	1.4	1.8
5	3.0	2.2	2.2	2.2	2.3	2.2	2.0	1.4	1.5	1.0	1.4	1.4
6	2.5	2.2	2.2	2.1	2.3	2.3	2.7	1.7	1.3	1.0	1.4	1.6
7	2.4	2.1	2.2	2.1	3.2	2.3	2.7	1.4	1.3	1.0	1.4	3.4
8	2.4	2.1	2.1	2.1	2.9	2.2	2.6	1.2	1.3	1.0	1.4	6.3
9	2.2	3.0	2.1	2.1	2.4	2.2	2.6	1.2	1.3	1.3	1.4	4.0
10	2.0	3.0	2.1	2.0	2.3	2.4	2.4	1.1	1.3	2.1	1.2	3.8
11	1.9	3.3	2.2	2.0	2.3	2.3	2.4	1.1	1.3	2.1	1.2	2.5
12	4.0	4.5	2.2	2.0	2.1	2.1	2.0	1.1	1.3	2.0	1.3	1.7
13	3.0	4.6	2.0	2.9	2.1	2.1	1.7	1.1	1.2	1.8	1.4	1.6
14	2.0	5.9	2.0	2.9	2.1	2.1	1.7	1.1	1.2	1.4	1.4	1.4
15	2.0	7.0	2.0	2.8	2.1	2.1	1.6	1.0	1.2	1.0	1.3	2.3
16	2.0	5.0	2.0	2.8	2.1	2.1	1.6	1.2	1.1	1.0	1.3	2.3
17	1.8	5.3	2.0	2.5	2.1	2.0	1.6	2.0	1.1	1.0	1.3	2.0
18	1.8	4.0	2.0	2.5	2.1	2.0	1.7	1.9	1.1	1.0	1.2	2.0
19	1.9	3.0	2.1	2.5	2.0	2.0	1.4	2.4	1.1	1.0	1.2	1.7
20	1.9	2.8	2.3	2.6	2.0	1.8	1.4	2.7	1.1	1.0	1.2	1.6
21	1.6	2.6	2.3	2.4	2.0	1.5	1.4	1.2	1.0	1.0	1.2	1.6
22	1.7	2.6	3.0	2.4	2.0	1.5	1.3	2.9	1.0	1.1	1.2	1.5
23	1.8	2.6	3.3	2.3	1.9	1.5	1.3	2.8	1.0	3.9	1.2	2.6
24	2.0	2.6	4.7	2.5	1.9	1.4	1.3	2.5	1.0	2.1	2.0	1.9
25	2.0	2.0	3.2	6.8	1.8	1.3	1.4	3.6	1.0	2.1	2.0	1.7
26	2.0	2.0	2.8	3.4	1.9	1.3	1.3	2.4	1.0	2.0	1.9	1.6
27	2.0	2.0	2.4	3.2	2.1	1.3	1.3	1.6	1.0	2.3	1.4	1.6
28	2.0	1.9	2.1	3.2	2.0	1.3	1.4	1.8	1.0	2.3	1.2	1.6
29	2.0	1.9	2.7	2.8	2.0	1.3	1.4	1.6	1.0	2.3	1.0	1.5
30	2.3	.....	2.5	2.7	2.0	1.3	1.4	1.6	1.0	1.9	1.5	1.5
31	2.6	.....	2.4	.....	2.0	.....	1.3	1.5	.....	1.6	.....	1.4

Rating table for Tallulah River at Tallulah Falls, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.40	117	1.70	485	3.00	1,340	4.60	3,000
.50	132	1.80	530	3.10	1,420	4.80	3,260
.60	149	1.90	580	3.20	1,510	5.00	3,530
.70	168	2.00	635	3.30	1,600	5.20	3,810
.80	189	2.10	695	3.40	1,690	5.40	4,110
.90	212	2.20	760	3.50	1,780	5.60	4,410
1.00	237	2.30	825	3.60	1,880	5.80	4,730
1.10	264	2.40	890	3.70	1,980	6.00	5,060
1.20	293	2.50	960	3.80	2,080	6.20	5,410
1.30	325	2.60	1,030	3.90	2,180	6.40	5,780
1.40	360	2.70	1,105	4.00	2,290	6.60	6,160
1.50	400	2.80	1,180	4.20	2,510	6.80	6,540
1.60	440	2.90	1,260	4.40	2,750	7.00	6,930

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 21 discharge measurements made during 1906 to 1908 and measurements of earlier years. It is well defined between gage heights 0.4 foot and 6 feet.

Monthly discharge of Tallulah River at Tallulah Falls, Ga., for 1907 and 1908.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	1,600	530	731	3.83	4.42
February	1,030	440	607	3.18	3.31
March	1,980	400	607	3.18	3.67
April	1,180	400	507	2.65	2.96
May	695	360	537	2.81	3.24
June	760	325	393	2.06	2.30
July	960	237	447	2.34	2.70
August	580	117	265	1.39	1.60
September	1,180	168	291	1.52	1.70
October	485	189	246	1.29	1.49
November	1,600	189	442	2.31	2.58
December	2,510	237	817	4.28	4.93
The year	2,510	117	491	2.57	34.90
1908.					
January	2,290	440	796	4.17	4.81
February	6,930	580	1,690	8.85	9.54
March	3,130	635	928	4.86	5.60
April	6,540	635	1,150	6.02	6.72
May	1,510	530	763	3.99	4.60
June	890	325	589	3.08	3.44
July	1,100	325	517	2.71	3.12
August	1,880	237	539	2.82	3.25
September	400	237	287	1.50	1.67
October	2,180	237	476	2.49	2.87
November	635	237	358	1.87	2.09
December	5,590	360	851	4.46	5.14
The year	6,930	237	745	3.90	52.85

NOTE.—The accuracy of the monthly discharge for 1907–8 is uncertain on account of poor gage heights.

CHAUGA RIVER NEAR MADISON, S. C.

This station is located at the wagon bridge one-fourth mile below the crossing of the Southern Railway, 2 miles from Madison, and about 2 miles above the mouth of the creek. The gage was first established here May 9, 1907, although miscellaneous discharge measurements had been made for several years. This station was discontinued December 31, 1907.

The vertical staff gage is attached to the bridge at which discharge measurements are made. On account of changing conditions of flow it has been impossible to develop a satisfactory rating curve.

Discharge measurements of Chauga River near Madison, S. C., in 1907.

Date	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 9	F. A. Murray	50	117	3.03	326
July 20	B. M. Hall, jr	50	99	2.28	145
November 7	F. A. Murray	48	68	1.70	103

Daily gage height, in feet, of Chauga River near Madison, S. C., for 1907.

[Observer, G. F. Fuller.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						3.4	2.35	2.1	1.95	2.2	1.55	2.2
2						3.1	2.3	2.15	1.9	2.1	1.6	2.1
3						2.95	2.25	2.1	1.85	1.9	2.2	2.1
4						2.75	4.8	2.1	3.0	1.6	1.8	2.1
5						2.7	2.4	2.1	2.6	1.5	1.75	2.05
6						2.6	2.35	2.15	2.0	1.75	1.75	1.95
7						2.6	2.3	2.0	2.0	1.7	1.7	1.9
8						2.65	2.25	2.05	1.9	1.8	1.7	1.9
9					3.0	2.85	2.2	1.9	1.7	1.8	1.7	1.9
10					2.95	2.65	2.15	1.95	1.8	1.75	1.9	1.8
11					3.0	2.6	2.15	1.95	2.0	1.7	2.0	1.7
12					2.9	2.55	2.15	2.0	1.5	1.7	2.8	1.6
13					2.85	2.5	2.8	1.95	1.5	1.7	2.4	2.9
14					2.85	2.65	2.3	1.9	1.6	1.6	1.6	3.4
15					2.9	2.6	2.35	1.95	1.9	1.6	1.6	2.9
16					2.9	2.5	2.55	2.6	2.0	1.6	1.55	2.7
17					2.8	2.45	2.3	2.1	1.9	1.6	1.5	2.6
18					2.75	2.4	2.25	3.0	1.8	1.6	2.5	2.5
19					2.75	2.8	2.5	2.5	1.7	1.6	2.2	2.4
20					2.7	2.7	2.4	2.3	1.6	1.6	2.8	2.4
21					2.7	2.4	2.2	2.2	1.6	1.55	4.3	2.3
22					2.7	2.4	2.1	2.1	1.6	1.55	2.7	2.3
23					2.7	2.4	2.1	2.0	3.6	1.55	5.6	9.1
24					2.65	2.5	2.1	2.1	2.95	1.55	3.7	4.0
25					2.65	2.4	2.1	2.1	2.3	1.55	3.0	3.1
26					2.65	2.35	2.05	2.0	2.1	1.55	2.6	2.9
27					2.9	2.3	2.2	2.0	2.0	1.75	2.4	2.7
28					2.8	3.5	2.25	2.0	2.7	1.85	2.15	2.5
29					2.75	3.1	2.1	2.0	2.4	1.6	2.2	2.5
30					2.65	2.4	3.7	2.1	2.3	1.55	2.2	7.8
31					3.0	.....	2.3	2.0	.....	1.55	.....	5.4

BROAD RIVER (OF GEORGIA) NEAR CARLTON, GA.

The station is located at the Seaboard Air Line Railway bridge 3 miles east of Carlton, Ga., and 2 miles above the mouth of the south fork. It was established May 27, 1897. The station is now maintained by the United States Weather Bureau.

The datum of the gage has remained constant since the establishment of the station; its elevation is 384 feet above sea level. The left bank overflows for about 400 feet at a gage height of about 16 feet. The bed of the stream is sand and gravel and slightly changeable. An excellent rating has been developed for this station for low and medium low stages.[a]

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Broad River (of Georgia) near Carlton, Ga., for 1907 and 1908.

[Observer, M. C. Power.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	6.7	2.6	4.4	2.6	2.7	5.3	2.4	3.0	1.7	2.3	1.8	2.9
2	6.3	3.5	5.5	2.5	2.7	3.6	2.5	2.6	1.5	2.0	1.8	2.7
3	3.9	3.4	6.3	2.5	2.7	3.0	2.5	2.4	1.5	2.0	1.8	2.5
4	3.6	3.4	5.2	2.5	3.0	2.6	2.4	2.6	4.0	2.0	1.8	2.5
5	3.4	6.0	3.7	2.5	3.0	2.5	2.4	2.0	2.8	2.0	1.8	2.5
6	3.4	6.0	3.4	2.5	3.0	2.4	2.4	2.0	2.2	2.0	1.8	2.4
7	3.3	4.6	3.2	3.0	3.1	2.4	2.3	1.9	2.0	1.9	1.8	2.4
8	3.1	3.5	3.1	2.9	2.9	2.3	2.2	1.9	2.0	1.9	1.8	2.3
9	3.0	3.3	3.0	2.6	2.9	2.3	2.0	1.9	1.9	1.9	1.8	2.3
10	3.0	3.1	3.0	2.6	2.7	2.3	2.2	1.9	1.9	1.9	2.0	3.0
11	3.0	3.1	3.0	2.6	2.6	2.3	2.5	1.9	1.9	1.7	2.0	3.3
12	2.9	3.0	3.0	2.7	2.6	2.2	2.5	1.9	1.9	1.7	2.0	3.0
13	2.9	3.0	2.9	2.6	2.6	2.2	3.7	1.9	1.9	1.7	2.2	2.6
14	2.8	2.9	2.9	2.6	2.6	2.7	2.8	1.9	1.9	1.7	2.2	5.0
15	2.8	2.9	3.0	2.5	2.6	2.6	3.1	2.4	1.9	1.7	2.0	4.9
16	2.8	2.8	3.0	2.5	2.7	2.6	3.5	3.3	2.0	1.7	2.0	4.0
17	2.7	2.8	3.0	2.5	2.6	2.5	2.6	3.1	1.9	1.7	2.0	3.6
18	2.7	2.8	2.9	2.6	2.6	2.4	2.2	2.5	1.8	1.7	2.2	3.0
19	2.6	2.8	2.7	2.6	2.5	2.4	3.4	2.5	1.7	1.7	3.0	3.0
20	2.6	2.8	2.7	2.5	2.4	2.3	3.0	3.0	1.7	1.7	3.0	3.0
21	2.6	2.7	2.7	3.0	2.4	2.3	2.8	2.5	1.7	1.7	3.2	2.9
22	2.6	2.7	2.7	3.0	2.3	2.3	2.5	2.5	1.7	1.7	5.3	2.6
23	2.6	2.7	2.6	6.1	2.3	2.3	2.3	3.3	5.5	1.7	3.9	6.6
24	2.5	2.7	2.6	7.6	2.3	2.3	2.2	2.2	4.1	1.7	6.1	6.2
25	2.5	2.8	2.6	4.7	2.6	2.3	2.1	2.0	2.5	1.7	6.0	5.0
26	2.5	2.9	2.6	3.5	2.4	2.5	2.0	1.9	2.0	1.7	4.0	3.5
27	2.5	4.1	2.6	3.0	3.0	2.4	2.0	1.9	2.0	1.7	2.6	3.0
28	2.5	3.8	2.6	3.0	2.8	2.4	1.9	1.8	2.7	1.8	2.4	3.0
29	2.5	.....	2.6	2.8	2.6	2.5	1.9	1.8	3.2	1.8	3.0	3.0
30	2.5	.....	2.5	2.7	2.5	2.5	3.6	1.8	3.0	1.8	3.6	7.1
31	2.6	.....	2.5	.....	2.6	.....	3.1	1.7	.....	1.8	.....	7.2
1908.												
1	9.1	6.6	3.0	3.0	3.3	2.6	2.5	2.3	3.3	2.4	3.7	2.5
2	4.3	6.0	2.9	3.0	3.0	2.6	2.5	2.2	3.0	2.4	3.0	2.6
3	3.6	5.0	2.9	3.0	3.0	2.5	3.0	2.2	3.0	2.4	2.8	2.6
4	3.0	4.6	2.9	3.0	3.0	2.5	3.6	2.2	2.9	2.4	4.5	2.5
5	4.4	3.0	2.8	3.0	3.0	2.6	5.3	2.8	3.2	2.3	4.4	2.5
6	4.0	3.0	2.8	3.2	3.0	2.5	7.3	4.0	5.0	2.3	3.3	2.5
7	4.4	3.0	2.8	3.5	3.5	2.5	5.2	3.5	6.3	2.3	3.0	3.0
8	5.0	2.8	2.8	3.4	3.7	2.5	5.0	2.7	4.1	2.3	3.0	5.5
9	3.8	2.8	2.7	3.4	3.0	2.5	3.9	4.4	3.0	2.4	2.8	5.5
10	3.0	4.0	2.7	3.0	3.0	2.5	3.7	3.5	2.8	2.4	2.5	4.6
11	3.0	6.6	2.7	3.0	2.8	4.1	4.0	3.0	2.6	4.1	2.5	3.4
12	7.5	8.0	3.0	2.8	2.8	3.2	3.2	2.6	2.5	3.5	2.5	3.0
13	7.3	6.0	3.0	2.8	2.8	2.6	2.6	2.4	2.5	2.5	2.5	3.3
14	5.0	4.6	3.0	2.8	2.8	2.6	2.8	2.3	2.5	2.5	3.3	3.0
15	3.5	7.7	2.8	3.0	2.8	4.0	2.6	2.3	2.5	2.4	3.0	2.9
16	3.3	9.5	2.8	9.1	2.8	3.3	2.5	2.3	2.5	2.4	3.0	2.9
17	3.0	8.0	2.7	7.2	2.7	4.0	2.5	2.3	2.5	2.4	2.8	2.8
18	3.0	3.8	2.7	4.3	2.7	5.3	2.5	2.3	2.4	2.4	2.7	2.7
19	2.9	4.1	2.7	4.3	3.0	4.5	2.5	2.8	2.4	2.3	2.6	2.7
20	2.9	4.6	2.7	4.0	3.4	3.0	2.5	3.2	2.4	2.3	2.6	2.7
21	2.9	3.9	4.6	3.4	3.0	2.7	2.4	3.0	2.4	2.3	2.6	2.7
22	2.6	3.6	3.7	3.3	2.8	2.7	2.4	3.5	2.4	2.3	2.6	6.4
23	2.6	3.4	5.0	3.0	2.7	3.0	2.4	6.5	2.4	3.0	2.6	9.0
24	2.5	3.3	13.4	3.0	2.7	2.8	2.3	15.0	2.4	4.5	2.6	8.6
25	2.5	3.2	10.0	3.3	2.7	2.6	2.3	30.0	2.4	3.5	2.6	4.0
26	2.5	3.2	5.1	9.1	2.7	2.6	2.3	23.5	2.4	3.3	2.6	3.5
27	2.6	3.0	4.0	7.3	2.6	3.4	2.3	8.0	2.4	3.0	2.5	3.3
28	2.8	3.0	3.7	4.7	3.0	2.8	2.3	4.8	2.5	3.6	2.5	3.0
29	2.6	3.0	3.5	3.7	2.8	2.5	2.3	4.0	2.5	6.8	2.5	3.0
30	2.6	.....	3.3	3.4	2.6	2.5	2.3	3.6	2.4	5.7	2.5	3.0
31	2.6	.....	3.2	.....	2.6	.....	2.3	3.4	.....	4.0	.....	3.0

NOTE.—The maximum stage of 39.0 feet, reached August 25, 1908, is the highest recorded since the establishment of this station.

Rating table for Broad River (of Georgia) near Carlton, Ga., for 1906 to 1908, inclusive.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	305	3.30	1,290	5.20	3,100	16.00	19,800
1.60	340	3.40	1,370	5.40	3,325	17.00	21,500
1.70	375	3.50	1,450	5.60	3,560	18.00	23,200
1.80	415	3.60	1,535	5.80	3,800	19.00	24,900
1.90	455	3.70	1,620	6.00	4,050	20.00	26,700
2.00	500	3.80	1,705	6.20	4,300	21.00	28,500
2.10	545	3.90	1,790	6.40	4,560	22.00	30,300
2.20	595	4.00	1,880	6.60	4,820	23.00	32,200
2.30	645	4.10	1,970	6.80	5,090	24.00	34,200
2.40	695	4.20	2,065	7.00	5,360	25.00	36,300
2.50	750	4.30	2,160	8.00	6,760	26.00	38,400
2.60	805	4.40	2,255	9.00	8,220	27.00	40,600
2.70	865	4.50	2,350	10.00	9,760	28.00	42,800
2.80	930	4.60	2,450	11.00	11,360	29.00	45,000
2.90	1,000	4.70	2,555	12.00	13,000	30.00	47,200
3.00	1,070	4.80	2,660	13.00	14,700		
3.10	1,140	4.90	2,770	14.00	16,400		
3.20	1,215	5.00	2,880	15.00	18,100		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 11 discharge measurements made during 1904–1906 and one measurement at gage height 9.05 feet made during 1899. Other measurements prior to 1904 serve to still further define the rating curve below 9 feet. It is well defined between gage heights 1.5 feet and 10 feet. The rating table is only approximate for stages above about 20 feet.

Monthly discharge of Broad River (of Georgia) near Carlton, Ga., for 1907 and 1908.

[Drainage area, 762 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	4,960	750	1,220	1.60	1.84	A.
February	4,050	805	1,370	1.80	1.87	A.
March	4,430	750	1,280	1.68	1.94	A.
April	6,200	750	1,220	1.60	1.78	A.
May	1,140	645	847	1.11	1.28	A.
June	3,210	595	822	1.08	1.20	A.
July	1,620	455	811	1.06	1.22	A.
August	1,290	375	649	.852	.98	A.
September	3,440	305	725	.951	1.06	A.
October	645	375	419	.550	.63	A.
November	4,180	415	1,040	1.36	1.52	A.
December	5,640	645	1,710	2.24	2.58	A.
The year	6,200	305	1,010	1.32	17.90	
1908.						
January	8,370	750	1,830	2.40	2.77	A.
February	8,990	930	2,730	3.58	3.86	A.
March	15,400	865	1,980	2.60	3.00	A.
April	8,370	930	2,090	2.74	3.06	A.
May	1,620	805	1,020	1.34	1.54	A.
June	3,210	750	1,110	1.46	1.63	A.
July	5,780	645	1,260	1.65	1.90	A.
August	47,200	595	4,490	5.89	6.79	B.
September	4,430	695	1,050	1.38	1.54	A.
October	5,090	645	1,180	1.55	1.79	A.
November	2,350	750	1,010	1.33	1.48	A.
December	8,220	750	1,790	2.35	2.71	A.
The year	47,200	595	1,800	2.36	32.07	

MISCELLANEOUS MEASUREMENTS IN SAVANNAH RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in Savannah River drainage basin during 1907:

Miscellaneous measurements in Savannah River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
June 13	Stekoa Creek	Chattooga River	At wagon bridge ¼ mile southeast of Clayton, Ga.	1.03	26
July 18	do	do	At wagon bridge ¼ mile southeast of Clayton, Ga.	.90	16
May 6	Toxaway Creek	Whitewater River	At bridge just below Lake Toxaway, N. C.	1.05	20

RIVER SURVEYS AND WATER POWER IN SAVANNAH RIVER DRAINAGE BASIN.

Surveys have been made in the Savannah drainage basin as follows:

Tallulah River from mouth near Tallulah Falls to Blalock, Ga.[a b]

Tugaloo and Savannah rivers from head of Tugaloo River to Augusta, Ga.[a]

Chattooga River from mouth to Russell Bridge, 0.7 mile north of Russell, S. C.[a b]

Broad River from mouth to Harrison Bridge near Carnesville, Ga.[a b]

Tugaloo and Savannah rivers from head of Tugaloo River to Lisbon, Ga.[b]

OGEECHEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Ogeechee River drains a small basin in southeastern Georgia lying between the Savannah and Altamaha basins. It rises in Greene County and flows in a southeasterly direction and empties into the Atlantic Ocean. Its main tributary is Cannoochee River, which rises in Emanuel County, Ga., flows southeastward, and joins it about 20 miles from the Atlantic Ocean.

The streams in this basin flow through a country that is mostly low. The current is generally good, but the fall available for power is probably small. The bank on one side or the other of the stream is generally low and swampy.

[a] Elevations taken on these surveys and brief statements regarding possible power development are given in Water resources of Georgia: Water-Supply Paper U. S. Geol. Survey No. 197.

[b] River surveys and profiles of 1903: Water-Supply Paper U. S. Geol. Survey No. 115.

The following gaging stations have been maintained in this river basin:[a]

Ogeechee River, Millen, Ga., 1903.
Williamsons Swamp Creek, Davidsboro, Ga., 1903–4.
Cannoochee River, Groveland, Ga., 1903–1907.

CANNOOCHEE RIVER NEAR GROVELAND, GA.

This station is located at Moody's Bridge, 3 miles south of Groveland, Bryan County, Ga. It is below the mouth of Lotts Creek, which is a tributary of Cannoochee River. The station was established June 12, 1903, and was discontinued December 31, 1907.

The datum of the vertical staff gage, which is fastened to the bridge from which discharge measurements are made, has remained unchanged. Both banks overflow at a stage of about 15 feet. Conditions at this station are poor for obtaining accurate ratings at low stages, owing to the shifting channel. A good rating curve has, however, been developed for medium stages up to the point of overflow.[b]

The following discharge measurement was made:

April 17, 1907: width, 94 feet; area, 263 square feet; gage height, 3.37 feet; discharge, 340 second-feet.

Daily gage height, in feet, of Cannoochee River near Groveland, Ga., for 1907.

[Observer, J. M. Edwards.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.3	3.0	4.5	2.3	4.0	5.2	10.2	6.9	2.9	13.5	3.7	5.0
2	3.5	3.3	4.5	2.5	3.6	5.8	10.2	7.2	2.8	16.1	3.7	4.9
3	3.5	4.5	4.8	2.8	3.5	5.6	10.9	7.3	2.7	15.8	3.7	4.8
4	3.5	4.8	5.5	3.0	3.4	5.4	15.0	7.4	2.5	15.2	3.7	4.8
5	3.5	5.0	5.9	2.9	4.1	5.1	16.6	7.6	2.5	14.2	3.8	4.7
6	3.5	5.0	5.4	2.8	4.1	4.9	15.9	7.9	2.5	11.5	4.0	4.6
7	3.3	5.1	4.9	2.0	4.2	3.8	15.7	7.2	2.5	9.5	4.0	4.5
8	3.0	5.5	4.7	3.0	4.3	3.6	14.5	6.9	2.5	8.5	3.8	4.2
9	2.9	6.3	3.8	4.0	4.5	3.3	13.2	6.5	2.4	8.0	3.6	3.9
10	2.7	7.0	3.0	4.4	4.7	3.0	10.4	6.2	2.3	7.7	3.5	4.4
11	2.6	7.0	3.1	4.2	5.0	2.8	7.7	5.7	2.3	8.6	3.4	5.5
12	2.5	6.0	3.1	3.9	5.0	2.5	6.1	5.2	2.4	9.1	3.6	6.0
13	2.5	5.5	3.0	3.7	5.1	2.3	5.9	5.1	2.6	9.8	3.6	6.5
14	2.4	5.0	3.0	3.9	5.1	2.5	5.6	5.8	3.0	9.8	3.8	7.0
15	2.4	4.6	3.2	3.6	5.6	3.2	6.7	6.6	3.3	9.0	3 9	8.9
16	2.3	4.2	3.0	3.5	6.1	3.1	7.3	6.6	4.5	6.8	4.1	10.1
17	2.3	4.0	3.0	3.4	6.0	3.05	8.4	7.5	6.4	6.3	4.4	10.8
18	2.3	3.8	3.0	3.4	5.9	3.0	9.0	7.6	6.2	5.7	4.2	10.8
19	2.3	3.5	2.9	3.3	5.3	3.0	7.8	7.8	6.0	5.3	4.0	10.7
20	2.3	3.5	2.9	4.5	4.8	3.0	7.0	7.7	5.2	5.0	4.4	10.5
21	2.2	4.3	2.8	4.6	4.0	2.7	6.5	7.6	4.5	4.7	4.2	9.8
22	2.2	4.4	2.8	4.8	3.3	2.0	6.0	6.3	4.0	4.6	4.0	8.6
23	2.2	4.5	2.8	5.1	2.9	1.7	5.5	5.9	4.2	4.5	4.0	8.9
24	2.2	4.5	2.8	5.5	2.6	1.8	5.0	5.6	4.4	4.5	4.0	9.2
25	2.3	4.5	2.8	6.3	2.5	1.9	4.8	5.4	4.6	4.4	4.0	9.7
26	2.3	4.4	2.7	6.3	2.4	1.8	4.6	4.9	4.8	4.2	4.0	9.9
27	2.3	4.4	2.6	6.3	2.5	1.8	4.5	4.6	5.2	4.1	4.2	10.2
28	2.8	4.5	2.4	5.2	2.7	2.0	4.9	4.0	5.7	4.0	4.5	10.3
29	2.8	.....	2.4	4.8	2.8	4.3	5.3	3.5	8.2	4.0	4.6	10.4
30	2.9	.....	2.3	4.3	3.0	8.8	6.5	3.2	11.5	3.9	4.8	9.9
31	2.9	.....	2.3	.....	3.2	.....	6.8	3.0	.....	3.8	.....	9.4

[a] Data collected in this drainage basin prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

[b] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Rating table for Cannoochee River near Groveland, Ga., for 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.70	92	3.20	283	4.70	586	7.40	1,373
1.80	101	3.30	300	4.80	610	7.60	1,438
1.90	110	3.40	318	4.90	635	7.80	1,504
2.00	120	3.50	336	5.00	660	8.00	1,570
2.10	130	3.60	355	5.20	714	9.00	1,915
2.20	141	3.70	374	5.40	769	10.00	2,275
2.30	153	3.80	394	5.60	825	11.00	2,650
2.40	165	3.90	414	5.80	882	12.00	3,025
2.50	178	4.00	434	6.00	940	13.00	3,400
2.60	191	4.10	454	6.20	1,000	14.00	3,775
2.70	205	4.20	475	6.40	1,060	15.00	4,150
2.80	219	4.30	496	6.60	1,121	16.00	4,525
2.90	234	4.40	518	6.80	1,183	17.00	4,900
3.00	250	4.50	540	7.00	1,245		
3.10	266	4.60	563	7.20	1,309		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on four discharge measurements made during 1906–7 and measurements of earlier years. It is well defined above gage height 5 feet. Below 5 feet it is not well defined.

Monthly discharge of Cannoochee River near Groveland, Ga., for 1907.

[Drainage area, 960 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	336	141	211	0.220	0.25	C.
February	1,240	250	613	.639	.67	B.
March	911	153	345	.359	.41	B.
April	1,030	120	466	.485	.54	B.
May	970	165	477	.497	.57	B.
June	1,840	92	379	.395	.44	B.
July	4,750	540	1,830	1.91	2.20	A.
August	1,540	250	1,020	1.06	1.22	B.
September	2,840	153	546	.569	.63	B.
October	4,560	394	1,620	1.69	1.95	A.
November	610	318	430	.448	.50	B.
December	2,580	414	1,540	1.60	1.84	A.
The year	4,750	92	790	.823	11.22	

ALTAMAHA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Altamaha River rises in the north central part of Georgia along the southern slope of the Chattahoochee Ridge and flows in a southeasterly direction, emptying into the Atlantic Ocean near Darien. The basin is about 250 miles long and has an area of 14,100 square miles.

The two main tributaries forming the Altamaha are Oconee and Ocmulgee rivers, which unite about 100 miles above Darien. Oconee River rises on the southern slope of Chattahoochee Ridge in Hall County and flows in a southeasterly direction to the Altamaha. Apalachee River enters the Oconee near the southeast corner of Morgan County. Little River enters the main stream about 15 miles above Milledgeville, Ga. Ocmulgee River, the westernmost of the main tributaries, rises on the southern slope of the Chattahoochee Ridge in Fulton, Dekalb, and Gwinnett counties; Yellow, South, and Alcovy rivers are its upper tributaries. Towaliga River enters the Ocmulgee at about the southwest corner of Jasper County, which is above Macon. Ohoopee River is a tributary of the Altamaha about 30 miles below the junction of Oconee and Ocmulgee rivers.

The mean annual rainfall of the basin is about 50 inches.

Above the fall line, which passes near Milledgeville and Macon, all of the streams have considerable amount of slope with many excellent sites for water-power development. For view of shoal on Chattahooche River near Franklin, Ga., see Plate III, *B*.

The following gaging stations have been maintained in this river basin:[a]

South River, Lithonia, Ga., 1903–4.
Ocmulgee River, Jackson, Ga., 1906–1908.
Ocmulgee River, Flovilla, Ga., 1901–1905.
Ocmulgee River, Macon, Ga., 1893–1908.
Yellow River, Almon, Ga., 1897–1901.
Alcovy River, Covington, Ga., 1901–1904.
Alcovy River, Stewart, Ga., 1905–6.
Towaliga River, Juliette, Ga., 1899–1901.
Oconee River, Barnett Shoals, near Watkinsville, Ga., 1901–2.
Oconee River, Greensboro, Ga., 1903–1908.
Oconee River, Carey, Ga., 1896–1898.
Oconee River, Fraleys Ferry near Milledgeville, Ga., 1905–1908.
Oconee River, Milledgeville, Ga., 1903–1905.
Oconee River, Dublin, Ga., 1898–1908.
Middle Oconee River, Athens, Ga., 1901–2.
Apalachee River, Buckhead, Ga., 1901–1908.
Ohoopee River, Reidsville, Ga., 1903–1907.

[a] Data collected in this drainage basin prior to 1906 have been compiled in Water-Supply Paper No. 197 Water resources of Georgia.

OCMULGEE RIVER NEAR JACKSON, GA.

The station is located at Pittmans Ferry, 8 miles southeast of Jackson, one-half mile above the mouth of Yellow Water Creek, 3 miles below Tussahaw Creek, and 6 miles above the old Flovilla station at Lamars Ferry. It is three-fourths mile below the dam of the Central Georgia Power Company, which is now under construction. This station was established May 18, 1906, to take the place of the Lamars Ferry station, for which records of discharge had been obtained from July 26, 1901, to September 27, 1902; from July 1 to December 31, 1903; and from August 1, 1904, to December 31, 1905.

The datum of the vertical staff gage, the lowest section of which is located 15 feet above the ferry cable, has remained constant since the establishment of the station. Both banks overflow at high stages for about 200 feet. Conditions of discharge are constant owing to a permanent rock shoal about 400 feet below the station, which controls the height of water at the gage. An excellent rating has been developed for low stages.[a]

Discharge measurements of Ocmulgee River near Jackson, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 14	Warren E. Hall	300	1,620	4.90	1,680
March 15	do	300	1,790	5.17	2,180
August 24	do	300	1,420	4.32	709
December 5	do	300	1,500	4.52	1,020
1908.					
February 6	Warren E. Hall	300	1,810	5.67	3,210
June 23	do	298	1,640	5.05	1,980

[a] Records of discharge at the Lamars Ferry station have been compiled in Water-Supply Paper No. 197 Water resources of Georgia.

Daily gage height, in feet, of Ocmulgee River near Jackson, Ga., for 1907 and 1908.

[Observer, C. A. Pittman.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	6.6	5.5	5.9	4.6	4.9	5.0	4.55	4.35	3.95	4.45	4.05	4.9
2	6.2	7.1	6.9	4.6	4.8	4.9	4.9	4.35	3.9	4.4	4.05	4.8
3	5.4	6.0	8.2	4.6	4.8	4.7	6.0	4.6	4.6	4.25	4.15	4.7
4	5.2	5.5	6.8	4.6	5.2	4.6	4.75	4.35	5.4	4.2	4.2	4.6
5	5.2	8.4	5.8	4.6	5.1	4.5	4.6	4.2	5.0	4.2	4.2	4.5
6	5.0	8.5	5.4	4.8	4.9	4.45	4.5	4.25	4.45	4.1	4.15	4.5
7	4.9	6.3	5.3	5.1	4.8	4.4	4.5	4.9	4.3	4.1	4.1	4.5
8	4.9	5.8	5.2	4.9	4.9	4.4	4.4	4.55	4.3	4.2	4.1	4.45
9	4.8	5.5	5.1	5.0	4.85	4.4	4.3	4.4	4.65	4.3	4.05	4.6
10	4.8	5.3	5.0	4.8	4.8	4.35	4.3	4.35	4.2	4.4	4.2	5.4
11	4.8	5.2	5.0	4.7	4.8	4.35	4.5	4.2	4.2	4.35	4.75	5.2
12	4.75	5.1	4.9	4.7	4.8	4.35	4.45	5.4	4.2	4.15	4.6	4.95
13	4.75	5.0	4.9	4.6	4.7	4.5	4.5	4.9	4.2	4.1	4.45	4.85
14	4.75	5.0	4.9	4.6	4.65	6.0	4.65	4.35	4.2	4.1	4.35	6.1
15	4.7	4.9	5.1	4.6	4.7	5.6	4.4	4.5	4.1	4.1	4.2	6.0
16	4.7	4.85	5.1	4.6	5.0	5.1	4.35	4.85	4.1	4.1	4.2	5.4
17	4.65	4.8	5.0	5.0	4.9	4.7	4.3	4.95	4.05	4.05	4.2	5.2
18	4.65	4.8	4.9	5.1	4.7	4.5	4.45	4.75	4.05	4.05	4.4	5.0
19	4.65	4.8	4.85	5.0	4.6	4.4	4.4	4.45	4.05	4.05	4.6	4.9
20	4.65	4.9	4.85	5.1	4.55	4.4	4.45	4.4	4.0	4.0	4.6	4.8
21	4.65	4.9	4.8	4.9	4.5	4.4	4.3	4.4	4.05	4.0	5.0	4.75
22	4.65	4.9	4.8	4.8	4.5	4.4	4.2	4.5	4.5	4.05	7.5	4.8
23	4.65	4.8	4.8	6.3	4.5	4.4	4.2	4.3	5.8	4.05	6.2	8.1
24	4.65	4.8	4.7	6.4	4.5	4.4	4.15	4.3	4.9	4.05	6.0	8.0
25	4.6	4.9	4.7	5.6	4.5	4.9	4.1	4.3	4.55	4.05	5.6	6.3
26	4.6	5.1	4.7	5.3	4.5	4.5	4.25	4.3	4.35	4.05	5.2	5.5
27	4.6	5.4	4.7	5.2	4.5	4.6	4.3	4.2	4.25	4.05	4.95	5.4
28	4.6	5.8	4.7	5.0	4.5	6.4	4.9	4.1	4.9	4.1	4.7	5.2
29	4.6	.....	4.7	5.2	4.5	6.2	4.6	4.1	4.95	4.05	5.0	5.2
30	4.6	.....	4.7	5.1	4.5	4.85	4.8	4.05	4.7	4.05	5.0	6.1
31	4.8	.....	4.6	.....	4.5	.....	4.55	4.05	.....	4.05	.....	6.6
1908.												
1	6.0	11.6	5.3	5.3	5.6	5.2	4.4	4.2	4.55	4.3	4.7	4.4
2	5.6	10.2	5.2	5.2	5.4	4.95	4.65	4.2	4.5	4.25	4.55	4.6
3	5.2	7.0	5.2	5.2	5.3	4.7	4.85	4.2	4.4	4.2	4.5	4.6
4	5.2	6.1	5.2	5.0	5.1	4.7	4.9	4.2	4.4	4.1	4.9	4.5
5	5.8	5.6	5.2	4.95	5.1	4.75	5.9	4.8	4.6	4.15	5.0	4.45
6	5.7	5.6	5.1	5.1	5.1	4.95	6.2	4.85	6.1	4.2	4.8	4.65
7	6.0	5.4	5.1	5.2	5.4	4.75	5.8	4.55	5.3	4.2	4.6	4.8
8	6.2	5.4	5.1	5.1	5.3	4.7	5.5	4.5	5.0	4.15	4.55	5.2
9	5.8	5.2	5.0	5.0	5.1	4.6	5.6	4.6	4.8	4.3	4.5	5.0
10	5.4	6.4	4.95	4.95	5.0	4.7	5.4	4.9	4.65	4.8	4.4	4.75
11	6.4	9.0	5.0	4.95	4.9	5.0	5.1	4.6	4.5	4.7	4.4	4.6
12	7.8	8.3	5.0	4.85	4.9	4.7	4.8	4.5	4.5	4.5	4.4	4.75
13	6.9	6.8	5.0	4.8	4.85	4.6	4.8	4.4	4.3	4.4	4.4	4.7
14	6.2	6.2	5.0	4.9	4.8	4.7	4.95	4.3	4.3	4.35	4.5	4.6
15	5.6	9.8	4.95	6.0	4.8	6.0	4.6	4.2	4.3	4.3	4.9	4.55
16	5.4	10.2	4.9	5.6	4.75	5.8	4.55	4.2	4.3	4.3	4.8	4.5
17	5.3	7.8	4.9	5.9	4.75	4.95	4.5	4.2	4.3	4.25	4.7	4.5
18	5.2	6.4	4.9	5.4	5.2	5.0	4.5	4.45	4.3	4.2	4.55	4.5
19	5.1	6.7	4.9	5.4	5.2	5.0	4.4	4.55	4.3	4.2	4.5	4.5
20	5.0	6.4	4.9	5.4	5.0	4.75	4.4	4.5	4.3	4.2	4.5	4.45
21	5.0	6.0	5.2	5.2	4.9	5.6	4.4	4.5	4.3	4.2	4.45	4.5
22	4.95	5.6	5.2	5.1	4.8	6.8	4.3	4.65	4.3	4.2	4.4	8.6
23	4.9	5.5	6.0	5.4	4.7	5.2	4.3	5.2	4.3	4.2	4.4	9.2
24	4.85	5.4	9.4	5.3	4.7	4.9	4.3	5.5	4.3	4.25	4.4	7.0
25	4.8	5.4	9.8	6.3	4.8	4.85	4.3	8.9	4.25	4.2	4.4	5.8
26	4.8	5.6	8.1	9.6	5.2	4.7	4.3	9.9	4.2	4.3	4.4	5.4
27	5.1	5.6	6.6	11.1	5.2	4.6	4.3	8.6	4.2	4.3	4.4	5.2
28	4.9	5.4	6.0	8.4	5.4	4.5	4.25	6.7	4.25	4.5	4.4	4.95
29	4.8	5.3	5.6	6.7	5.0	4.5	4.45	5.4	4.3	5.4	4.4	4.8
30	4.8	.....	5.5	6.0	7.2	4.45	4.3	4.9	4.3	5.2	4.4	4.85
31	4.95	.....	5.4	.....	5.6	.....	4.3	4.65	.....	4.85	.....	5.6

Rating table for Ocmulgee River near Jackson, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.90	300	5.20	2,220	6.50	5,000	8.60	10,920
4.00	380	5.30	2,420	6.60	5,250	8.80	11,540
4.10	470	5.40	2,620	6.70	5,510	9.00	12,170
4.20	580	5.50	2,820	6.80	5,770	9.20	12,830
4.30	700	5.60	3,030	6.90	6,030	9.40	13,490
4.40	840	5.70	3,240	7.00	6,300	9.60	14,150
4.50	1,000	5.80	3,450	7.20	6,840	9.80	14,820
4.60	1,160	5.90	3,670	7.40	7,380	10.00	15,500
4.70	1,320	6.00	3,890	7.60	7,940	11.00	18,900
4.80	1,490	6.10	4,110	7.80	8,510	12.00	22,300
4.90	1,660	6.20	4,330	8.00	9,100		
5.00	1,840	6.30	4,550	8.20	9,700		
5.10	2,030	6.40	4,770	8.40	10,300		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 10 discharge measurements made during 1906–8, and is well defined between gage heights 4.3 feet and 6 feet. Above gage height 8 feet the rating curve is only approximate. Above gage height 9.7 feet the rating curve is a tangent, the difference being 340 per tenth.

Monthly discharge of Ocmulgee River near Jackson, Ga., for 1907 and 1908.

[Drainage area, 1,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	5,250	1,160	1,660	1.19	1.37	A.
February	10,600	1,490	2,990	2.14	2.23	A.
March	9,700	1,160	2,330	1.66	1.91	A.
April	4,770	1,160	1,850	1.32	1.47	A.
May	2,220	1,000	1,340	.957	1.10	A.
June	4,770	770	1,480	1.06	1.18	A.
July	3,890	470	1,040	.743	.86	A.
August	2,620	425	941	.672	.77	A.
September	3,450	300	969	.692	.77	A.
October	920	380	520	.371	.43	B.
November	7,660	425	1,460	1.04	1.16	A.
December	9,400	920	2,640	1.89	2.18	A.
The year	10,600	300	1,600	1.14	15.43	
1908.						
January	8,510	1,490	2,850	2.04	2.35	A.
February	20,900	2,220	6,160	4.40	4.74	B.
March	14,800	1,660	3,290	2.35	2.71	A.
April	19,200	1,490	3,740	2.67	2.98	B.
May	6,840	1,320	2,130	1.52	1.75	A.
June	5,770	920	1,810	1.29	1.44	A.
July	4,330	640	1,480	1.06	1.22	A.
August	15,200	580	2,420	1.73	1.99	A.
September	4,110	580	1,010	.721	.80	A.
October	2,620	470	848	.606	.70	A.
November	1,840	840	1,070	.764	.85	A.
December	12,800	840	2,300	1.64	1.89	A
The year	20,900	470	2,430	1.73	23.42	

OCMULGEE RIVER AT MACON, GA.

The station is located at the Fifth Street Bridge in the city of Macon, near the Southern Railway passenger depot, and about 500 feet above the Central of Georgia Railroad bridge. The United States Weather Bureau established a gage at Macon January 21, 1893, and

October 18, 1895, discharge measurements were begun by the United States Geological Survey. Gage heights are furnished by the United States Weather Bureau.

The several gages which have been used at this point have all been referred to the same datum and have given practically the same readings, varying slightly owing to surface slope between locations. Both banks are high and not subject to overflow. The bed of the river is soft and shifting and a great amount of change in the station rating has occurred owing to change in the river bed at and below the station.[a] For a reproduction of the low-water portion of the ratings given below, see figure 1, page 23.

Discharge measurements of Ocmulgee River at Macon, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 20	Warren E. Hall	258	1,860	5.04	2,770
August 23	do	217	1,040	1.78	1,100
1908.					
February 13	Warren E. Hall	296	4,060	12.86	9,710
August 13	do	234	1,170	2.92	1,310
October 31	M. R. Hall	254	1,570	4.83	2,430
Do	do	254	1,570	4.83	2,390

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Ocmulgee River at Macon, Ga., for 1907 and 1908.

[Observer, United States Weather Bureau.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	10.8	5.0	8.8	3.1	5.1	4.1	4.4	2.9	0.6	3.6	0.8	5.8
2	10.6	13.3	11.3	3.2	4.6	4.9	3.1	2.3	.4	2.4	.8	4.5
3	8.6	11.8	13.7	3.3	4.2	3.7	7.6	2.3	.1	1.3	.9	3.9
4	6.6	9.4	13.2	3.1	5.9	3.2	8.2	3.6	5.2	1.6	.7	3.4
5	6.0	16.2	10.3	3.0	5.8	2.6	4.4	3.6	3.1	1.4	.7	3.0
6	5.5	14.9	8.1	3.2	4.8	2.6	3.9	2.4	4.2	1.2	1.0	2.7
7	4.9	13.0	6.8	3.8	4.3	2.2	2.5	2.5	2.1	1.1	.9	2.6
8	4.4	9.9	5.6	4.2	4.1	2.0	2.0	3.8	1.5	.9	.9	2.5
9	4.2	8.1	5.2	4.2	7.0	1.9	1.8	2.5	3.2	1.0	.8	2.3
10	4.0	6.8	4.9	4.0	4.8	1.8	1.5	2.5	2.9	1.1	.8	8.1
11	4.0	5.8	4.5	3.4	5.2	1.7	1.6	1.5	1.3	1.6	1.7	7.0
12	3.8	5.3	4.5	3.2	4.0	1.7	1.9	1.8	1.0	1.3	2.9	5.6
13	3.7	4.9	4.4	3.0	3.7	2.9	2.0	5.1	1.1	1.0	2.7	4.5
14	3.6	4.7	4.3	2.9	3.5	3.3	2.0	4.6	1.1	.8	1.2	15.0
15	3.5	4.5	5.0	2.6	4.2	7.6	3.3	2.8	1.1	.6	1.5	12.3
16	3.5	4.3	5.4	2.6	4.6	5.3	2.9	2.8	.8	.8	1.2	9.7
17	3.4	4.1	6.1	4.3	4.7	3.8	2.2	4.2	.6	.9	1.2	7.2
18	3.3	4.0	4.4	8.1	3.9	2.7	1.8	4.4	.7	.8	1.2	5.7
19	3.3	3.9	4.2	9.3	3.3	2.2	1.9	3.3	.7	.8	1.9	5.0
20	3.4	4.1	4.1	5.2	2.9	1.8	1.8	2.7	.7	.8	2.5	4.6
21	3.7	4.5	3.9	5.1	2.9	1.8	1.7	1.7	.6	.7	3.2	4.2
22	3.5	4.1	3.8	4.1	2.4	1.7	1.4	1.4	1.0	.6	6.1	3.8
23	3.2	3.8	3.8	12.2	2.4	1.7	1.1	1.9	1.4	.7	14.4	17.1
24	3.1	3.7	3.5	11.8	2.3	1.6	1.1	1.6	8.2	.8	11.5	15.4
25	3.0	3.9	3.5	9.9	2.4	1.5	1.0	1.6	4.6	.8	9.6	13.5
26	3.2	4.6	3.4	7.3	2.3	3.2	1.0	1.2	2.4	.7	7.3	9.8
27	3.3	5.1	3.3	5.8	2.3	2.3	1.3	1.0	1.8	.7	5.2	7.5
28	3.2	6.8	3.2	5.2	3.0	2.6	3.6	1.1	1.6	.7	4.1	6.4
29	3.1	.....	3.2	6.0	2.6	9.7	3.2	1.0	12.1	.4	5.6	7.6
30	3.0	.....	3.1	6.0	2.3	9.1	4.1	.8	5.9	.8	6.8	10.4
31	3.4	.....	3.0	.....	2.2	.....	4.4	.7	.....	.8	.....	14.0
1908.												
1	11.9	18.1	6.3	6.8	9.9	7.0	3.2	2.5	3.9	2.3	3.9	2.3
2	9.5	18.0	6.0	6.5	7.8	6.5	3.4	2.4	3.6	2.1	3.3	2.7
3	7.7	16.2	6.0	6.0	7.6	5.2	3.5	2.4	3.3	2.1	3.1	2.6
4	6.4	11.0	6.3	5.5	6.9	4.4	4.4	2.4	3.1	1.9	4.0	2.5
5	6.7	9.0	5.9	5.3	6.5	4.8	4.4	2.3	3.2	1.8	4.4	2.5
6	9.2	8.2	5.8	5.2	6.3	5.0	8.5	4.8	6.6	1.7	4.0	2.6
7	12.9	8.2	5.5	4.9	6.3	4.8	7.1	4.5	9.9	1.9	3.8	2.5
8	14.2	7.4	5.4	5.9	6.1	4.4	7.8	3.7	7.1	1.9	3.3	3.5
9	11.0	6.5	5.2	5.3	6.5	4.3	6.8	4.3	5.1	1.9	3.0	4.8
10	8.8	6.4	5.1	5.1	6.0	4.0	8.9	3.6	4.1	2.2	2.8	4.3
11	7.4	17.4	4.9	5.0	5.7	3.9	8.1	3.2	3.6	3.7	2.7	3.9
12	15.9	16.1	4.9	4.6	5.5	4.0	5.4	3.6	3.2	3.4	2.6	3.8
13	13.0	13.8	5.0	4.4	5.3	4.2	4.4	3.3	2.8	3.0	2.5	3.7
14	11.8	11.6	4.9	4.4	5.2	3.8	4.8	2.7	2.6	2.9	2.8	3.4
15	9.2	12.8	4.8	19.7	5.0	3.7	4.6	2.3	2.8	2.5	3.3	3.2
16	7.7	16.5	4.8	16.1	4.9	3.6	4.4	2.2	2.9	2.3	4.0	3.0
17	7.0	15.9	4.7	11.2	4.7	7.1	4.0	2.1	2.4	2.1	3.7	2.8
18	6.3	12.4	4.5	9.5	4.8	5.6	3.1	2.0	2.3	2.1	3.4	2.7
19	5.8	11.3	4.4	7.5	6.9	5.5	4.0	2.9	2.3	2.0	3.2	2.7
20	5.2	12.2	4.3	7.5	6.5	4.9	3.8	3.6	2.4	1.9	2.9	2.7
21	5.2	10.9	4.3	7.3	5.7	4.1	3.6	3.4	2.2	1.8	2.8	2.5
22	5.0	9.3	4.9	6.0	5.6	11.0	3.1	4.2	2.3	1.9	2.7	5.0
23	4.9	8.3	9.7	11.1	4.8	11.6	2.9	4.1	2.4	2.0	2.5	16.9
24	4.6	7.5	18.9	8.9	4.6	6.7	3.1	4.5	2.4	2.4	2.4	14.9
25	4.4	7.1	17.9	8.7	4.7	6.0	3.8	11.8	2.3	2.0	2.3	10.8
26	4.2	6.9	15.6	13.2	4.8	5.7	2.7	17.2	2.1	2.1	2.6	7.7
27	4.0	7.9	12.7	20.1	7.1	4.3	2.4	15.0	2.1	1.9	2.6	6.1
28	5.2	7.5	10.7	19.5	6.1	3.6	2.5	12.5	2.1	3.2	2.5	5.5
29	4.6	6.8	9.1	14.0	6.5	3.5	2.5	10.2	2.2	4.8	2.5	4.8
30	4.2	.....	7.9	12.2	5.8	3.4	3.6	6.0	2.2	3.3	2.4	4.5
31	4.6	.....	7.1	.....	10.9	.....	3.2	4.4	.....	5.2	.....	4.4

Rating tables for Ocmulgee River at Macon, Ga.

FOR 1906 AND 1907.[a]

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.10	525	1.80	1,090	3.50	1,870	6.40	3,650
.20	550	1.90	1,130	3.60	1,920	6.60	3,790
.30	575	2.00	1,170	3.70	1,975	6.80	3,930
.40	605	2.10	1,215	3.80	2,030	7.00	4,070
.50	635	2.20	1,260	3.90	2,085	8.00	4,800
.60	665	2.30	1,305	4.00	2,140	9.00	5,580
.70	695	2.40	1,350	4.20	2,250	10.00	6,440
.80	725	2.50	1,395	4.40	2,370	11.00	7,470
.90	755	2.60	1,440	4.60	2,490	12.00	8,790
1.00	790	2.70	1,485	4.80	2,610	13.00	10,580
1.10	825	2.80	1,530	5.00	2,730	14.00	13,230
1.20	860	2.90	1,575	5.20	2,860	15.00	16,940
1.30	895	3.00	1,620	5.40	2,990	16.00	21,200
1.40	930	3.10	1,670	5.60	3,120	17.00	25,800
1.50	970	3.20	1,720	5.80	3,250	18.00	30,700
1.60	1,010	3.30	1,770	6.00	3,380	19.00	35,750
1.70	1,050	3.40	1,820	6.20	3,510	20.00	40,960

FOR 1908.[b]

1.70	865	3.10	1,425	4.50	2,190	6.80	3,680
1.80	900	3.20	1,470	4.60	2,250	7.00	3,820
1.90	935	3.30	1,520	4.70	2,310	7.20	3,960
2.00	970	3.40	1,570	4.80	2,370	7.40	4,100
2.10	1,005	3.50	1,620	4.90	2,430	7.60	4,240
2.20	1,045	3.60	1,670	5.00	2,490	7.80	4,380
2.30	1,085	3.70	1,725	5.20	2,620	8.00	4,530
2.40	1,125	3.80	1,780	5.40	2,750	9.00	5,310
2.50	1,165	3.90	1,835	5.60	2,880	10.00	6,260
2.60	1,205	4.00	1,890	5.80	3,010	11.00	7,410
2.70	1,245	4.10	1,950	6.00	3,140	12.00	8,790
2.80	1,290	4.20	2,010	6.20	3,270		
2.90	1,335	4.30	2,070	6.40	3,400		
3.00	1,380	4.40	2,130	6.60	3,540		

[a] The above table is not applicable for obstructed-channel conditions. It is based on four discharge measurements made during 1906–7, and on the form of preceding curves. The high-water part of the curve is based on measurements of earlier years. The curve is well defined. This rating table supersedes the rating table used in the 1906 report.

[b] The above table is not applicable for obstructed-channel conditions. It is based on three discharge measurements made during 1908 and on the form of preceding curves. The high-water part of the curve is based on measurements of earlier years; the curve is well defined; above 12 feet it is the same as for 1906–7.

NOTE.—For a reproduction of the low-water portion of the ratings given above, see figure 1, page 23.

Monthly discharge of Ocmulgee River at Macon, Ga., for 1906, 1907, and 1908.

[Drainage area, 2,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1906.[a]						
January	40,400	2,550	7,210	2.98	3.44	B.
February	3,720	1,920	2,550	1.05	1.09	A.
March	25,800	1,820	7,170	2.96	3.41	B.
April	5,740	1,720	2,690	1.11	1.24	A.
May	2,610	1,260	1,650	.682	.79	A.
June	30,700	1,170	5,560	2.30	2.57	B.
July	6,930	1,300	3,050	1.26	1.45	B.
August	7,710	1,620	3,450	1.43	1.65	B.
September	6,260	1,260	3,010	1.24	1.38	B.
October	31,700	1,580	6,230	2.57	2.96	B.
November	3,060	1,480	1,800	.744	.83	B.
December	3,930	1,480	2,010	.831	.96	B.
The year	40,400	1,170	3,860	1.60	21.77	
1907.						
January	7,250	1,620	2,500	1.03	1.19	B.
February	22,100	1,980	4,910	2.03	2.11	A.
March	12,300	1,620	3,430	1.42	1.64	A.
April	9,100	1,440	3,010	1.24	1.38	A.
May	4,070	1,260	2,080	.860	.99	A.
June	6,170	970	1,880	.777	.87	A.
July	4,950	790	1,590	.657	.76	A.
August	2,800	695	1,410	.583	.67	A.
September	8,940	525	1,570	.649	.72	A.
October	1,920	605	824	.340	.39	A.
November	14,600	695	2,290	.946	1.06	A.
December	26,300	1,300	5,680	2.35	2.71	B.
The year	26,300	525	2,600	1.07	14.49	
1908.						
January	20,800	1,890	5,150	2.13	2.46	B.
February	31,200	3,400	10,700	4.42	4.77	B.
March	35,200	2,070	5,780	2.39	2.76	B.
April	41,500	2,130	8,630	3.57	3.98	B.
May	7,280	2,250	3,300	1.36	1.57	B.
June	8,220	1,570	2,750	1.14	1.27	B.
July	5,230	1,120	2,250	.930	1.07	A.
August	26,800	970	3,550	1.47	1.70	A.
September	6,160	1,000	1,640	.678	.76	A.
October	2,620	865	1,180	.488	.56	B.
November	2,130	1,080	1,430	.591	.66	B.
December	25,300	1,080	3,180	1.31	1.51	A.
The year	41,500	865	4,130	1.71	23.07	

[a] The monthly discharge for 1906 as given above supersedes the monthly discharge table given in the 1906 report.

ALCOVY RIVER NEAR STEWART, GA.

The station was established September 16, 1905, and was discontinued December 25, 1906. For information and data regarding see earlier reports.[a]

OCONEE RIVER NEAR GREENSBORO, GA.

The station is located at the new wagon bridge about 5 miles west of Greensboro on the road to Madison, Ga. It is below the mouth of Town Creek. It was established July 25, 1903.

[a] Water-Supply Papers 168, 197, and 204, U. S. Geol. Survey.

The datum of the gage has not changed during the maintenance of the station. The left bank is low and overflows at a stage of about 12 to 15 feet for a distance of about 600 feet. The relation of discharge to gage height changes somewhat. A fair rating, however, has been developed for medium and low stages at this point.[a]

Discharge measurements of Oconee River near Greensboro, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 16	M. R. Hall	120	648	4.13	1,560
November 27	do	121	713	4.62	1,750

Daily gage height, in feet, of Oconee River near Greensboro Ga., for 1907 and 1908.

[Observer, A. M. Thurmond.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	6.7	4.8	8.3	3.0	3.3	7.6	3.0	3.5	0.8	2.85	1.25	3.4
2	9.0	5.6	9.5	3.2	3.3	4.6	2.5	1.95	1.25	2.3	1.45	3.2
3	6.6	4.6	11.1	2.9	3.0	4.0	2.4	2.25	1.25	1.9	1.5	2.95
4	5.2	4.1	11.2	2.7	3.1	3.3	3.5	2.0	3.3	1.95	1.6	2.55
5	4.2	11.2	7.4	3.3	3.4	2.7	3.2	1.35	3.9	1.65	1.6	2.65
6	3.7	10.3	5.6	2.8	3.5	2.4	2.3	1.5	3.2	1.6	1.5	2.4
7	3.6	8.4	4.6	2.2	3.1	2.3	2.4	1.6	1.7	1.5	1.5	2.45
8	3.4	5.8	4.3	3.8	3.8	2.2	1.95	1.3	1.4	1.95	1.35	2.55
9	3.3	4.4	4.1	3.4	3.6	2.1	1.85	3.0	2.0	1.95	1.45	2.55
10	3.3	4.2	4.0	2.9	3.3	2.0	1.75	1.5	1.9	1.85	1.6	3.6
11	3.2	3.9	3.8	2.8	3.0	1.9	2.5	2.65	1.45	1.6	2.45	3.7
12	3.1	3.6	3.6	2.7	2.9	2.7	2.4	2.15	1.15	1.5	3.0	3.5
13	3.1	3.4	3.6	3.0	2.7	2.7	2.8	1.75	1.2	1.15	2.2	3.8
14	3.0	3.3	3.5	2.9	2.7	4.0	2.45	4.4	2.0	1.45	1.95	8.5
15	2.9	3.2	4.0	2.8	2.9	3.5	2.35	5.2	.95	1.4	1.65	7.2
16	2.9	3.1	4.1	3.7	3.0	2.2	2.6	4.0	1.15	1.55	1.65	6.2
17	2.9	3.1	3.7	3.4	2.9	2.4	2.3	4.0	1.45	1.25	1.55	4.4
18	2.8	3.1	3.5	3.0	2.7	2.7	2.0	3.0	1.35	1.3	2.05	3.7
19	2.8	3.7	3.4	2.9	2.7	1.8	2.15	2.95	1.35	1.4	2.95	3.4
20	2.9	3.3	4.0	2.9	2.7	2.0	2.55	2.05	1.25	1.15	3.6	3.2
21	3.0	3.2	3.3	3.6	2.6	1.9	2.25	1.8	1.05	1.25	5.6	3.0
22	2.6	3.1	3.2	8.9	2.4	2.3	1.75	1.55	.95	1.55	10.2	3.4
23	2.5	2.9	3.0	9.3	2.4	2.3	1.85	1.65	7.0	1.4	11.2	12.3
24	2.5	3.1	2.9	8.7	2.3	2.5	1.6	1.45	8.4	1.35	8.0	11.8
25	2.5	3.9	2.9	7.3	2.5	2.6	1.4	2.2	5.8	1.25	7.3	10.2
26	2.7	4.1	2.9	5.6	2.8	2.4	1.55	1.6	2.4	1.4	6.2	6.7
27	2.7	6.9	2.9	4.1	4.9	2.2	1.3	1.65	1.85	1.25	4.8	4.6
28	2.6	7.3	2.8	3.8	2.3	5.6	1.9	1.35	4.6	1.45	3.6	4.4
29	2.6	.....	2.8	3.7	2.6	7.4	3.9	1.3	7.8	1.5	3.9	5.0
30	2.5	.....	2.7	3.5	2.5	4.5	4.2	1.15	4.8	1.55	3.8	9.2
31	2.5	.....	2.7	.....	2.9	.....	3.8	.95	.....	1.45	.....	10.6
1908.												
1	7.4	13.4	4.2	4.6	5.5	2.95	2.25	1.7	3.8	2.1	3.6	2.5
2	6.6	14.2	4.0	4.5	4.9	2.75	2.2	1.7	3.4	1.95	3.2	2.45
3	5.6	11.3	4.2	4.2	4.6	2.75	3.1	1.95	3.2	1.9	2.95	2.55
4	4.2	6.4	4.0	4.0	4.3	3.1	4.8	3.3	3.4	1.9	2.85	2.45
5	5.6	5.4	4.0	3.9	4.1	3.2	5.1	2.95	5.5	1.85	4.6	2.55
6	6.1	4.7	3.9	4.8	4.1	2.95	9.0	3.5	3.8	1.85	5.0	2.55
7	8.4	4.3	3.8	4.6	4.8	2.6	10.8	7.0	4.1	1.9	3.8	3.0
8	8.8	4.2	3.8	4.5	5.0	2.65	8.2	9.0	4.1	2.5	3.2	4.8
9	6.7	4.2	3.7	4.0	5.0	2.55	6.0	9.4	3.2	2.9	3.2	5.4
10	5.3	7.2	3.6	3.9	4.2	2.45	6.0	8.9	3.0	4.7	3.2	4.2
11	7.2	11.2	3.6	4.2	3.8	2.9	4.3	8.3	2.75	5.4	2.95	3.4
12	12.2	11.8	4.0	4.0	3.6	3.8	3.6	3.0	2.55	4.1	2.9	3.0
13	12.1	11.8	4.0	3.4	3.4	3.4	3.1	2.7	2.5	3.1	2.55	3.3
14	10.7	9.1	3.8	3.5	3.5	3.4	2.85	2.6	2.55	2.35	3.1	2.95
15	7.2	10.9	3.5	8.5	3.4	5.4	2.6	2.25	2.45	2.25	3.9	2.85

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Oconee River near Greensboro, Ga., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	5.2	13.2	3.5	8.8	3.4	4.7	2.6	2.25	2.45	2.1	4.2	2.75
17	4.7	13.6	3.4	12.5	3.4	3.9	2.45	2.2	2.35	2.05	3.3	2.85
18	4.4	11.2	3.4	12.2	3.4	4.0	2.55	2.7	2.35	1.95	3.0	2.85
19	4.2	8.8	3.4	7.2	4.2	2.95	2.45	4.6	2.35	1.9	2.95	2.8
20	4.0	7.6	3.4	6.4	4.2	2.75	2.25	4.0	2.35	2.1	2.75	2.85
21	3.7	6.3	5.6	5.4	3.6	2.85	2.1	3.6	2.35	2.15	2.6	4.8
22	3.6	5.5	6.7	4.7	3.4	9.8	2.0	3.8	2.35	2.2	2.55	10.2
23	3.5	5.2	13.8	4.8	3.2	3.9	1.95	4.8	2.15	2.45	2.6	13.6
24	3.5	4.8	14.7	5.0	3.1	3.6	1.85	7.2	2.25	2.35	2.5	13.2
25	3.4	5.2	16.8	7.6	3.7	3.0	1.95	17.1	2.3	2.85	2.55	8.8
26	3.3	5.0	16.8	9.7	3.2	3.0	2.15	32.8	2.2	2.6	2.55	7.4
27	3.4	4.6	13.2	13.2	3.1	3.5	2.05	29.6	2.35	2.6	2.45	4.4
28	3.5	4.4	7.2	15.2	3.4	3.2	2.15	18.6	2.45	5.0	2.55	3.9
29	3.2	4.3	6.4	12.2	3.4	2.8	2.7	9.7	2.3	6.8	2.45	3.6
30	3.3	.....	5.8	6.8	3.9	2.5	2.4	4.6	2.25	5.4	2.55	3.8
31	3.4	.....	4.9	.....	3.4	.....	2.05	4.3	.....	4.5	.....	3.8

NOTE.—The highest stage on August 26, 1908 (35.4 feet), is the highest recorded since the establishment of the station.

Rating table for Oconee River near Greensboro, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	345	2.70	970	5.20	2,120	17.00	10,590
.90	375	2.80	1,010	5.40	2,220	18.00	11,440
1.00	405	2.90	1,050	5.60	2,330	19.00	12,290
1.10	435	3.00	1,090	5.80	2,440	20.00	13,140
1.20	465	3.10	1,130	6.00	2,550	21.00	14,040
1.30	495	3.20	1,170	6.20	2,660	22.00	14,940
1.40	525	3.30	1,210	6.40	2,770	23.00	15,840
1.50	555	3.40	1,250	6.60	2,880	24.00	16,740
1.60	585	3.50	1,295	6.80	3,000	25.00	17,690
1.70	620	3.60	1,340	7.00	3,120	26.00	18,640
1.80	655	3.70	1,385	8.00	3,740	27.00	19,590
1.90	690	3.80	1,430	9.00	4,410	28.00	20,540
2.00	725	3.90	1,475	10.00	5,110	29.00	21,490
2.10	760	4.00	1,520	11.00	5,840	30.00	22,490
2.20	795	4.20	1,620	12.00	6,590	32.00	24,490
2.30	830	4.40	1,720	13.00	7,340	34.00	26,540
2.40	865	4.60	1,820	14.00	8,140	36.00	28,640
2.50	900	4.80	1,920	15.00	8,940		
2.60	935	5.00	2,020	16.00	9,740		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 18 discharge measurements made during 1903–1907, and is well defined between gage heights 0.8 foot and 11 feet. Above gage height 20 feet the rating curve is approximate.

Monthly discharge of Oconee River near Greensboro, Ga., for 1907 and 1908.

[Drainage area, 1,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	4,410	900	1,340	1.22	1.41	A.
February	5,990	1,050	1,970	1.79	1.86	A.
March	5,990	970	1,890	1.72	1.98	A.
April	4,620	795	1,590	1.45	1.62	A.
May	1,970	830	1,080	.982	1.13	A.
June	3,480	655	1,190	1.08	1.20	A.
July	1,620	495	879	.799	.92	A.
August	2,120	390	828	.753	.87	A.
September	4,000	345	1,070	.973	1.09	A.
October	1,030	450	582	.529	.61	A.
November	5,990	480	1,440	1.31	1.46	A.
December	6,820	865	2,240	2.04	2.35	A.
The year	6,820	345	1,340	1.22	16.50	

Monthly discharge of Oconee River near Greensboro, Ga., for 1907 and 1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.						
January	6,740	1,170	2,480	2.25	2.59	A.
February	8,300	1,620	3,920	3.56	3.84	A.
March	10,400	1,250	2,870	2.61	3.01	A.
April	9,100	1,250	3,110	2.83	3.16	A.
May	2,280	1,130	1,480	1.35	1.56	A.
June	4,970	882	1,320	1.20	1.34	A.
July	5,690	672	1,440	1.31	1.51	A.
August	25,300	620	3,940	3.58	4.13	B.
September	2,280	778	1,050	.955	1.07	A.
October	3,000	672	1,100	1.00	1.15	A.
November	2,020	882	1,140	1.04	1.16	A.
December	7,820	882	1,950	1.77	2.04	A.
The year	25,300	620	2,150	1.95	26.56	

OCONEE RIVER AT FRALEYS FERRY, NEAR MILLEDGEVILLE, GA.

The station is located at Fraleys Ferry, 6 miles above Milledgeville, Ga., and about 4 miles below the mouth of Little River. At this point, which is above the dam at Milledgeville, there is nearly natural flow. The river is but slightly affected by dams a great distance upstream. It was established May 23, 1906, to take the place of the Milledgeville station and was discontinued December 31, 1908. A temporary gage was maintained from October 20, 1905, to November 14, 1905, at Fraleys Ferry, and the original station at Milledgeville was maintained from August 22, 1903, to December 31, 1905. The Milledgeville station is now maintained by the United States Weather Bureau, but on account of the daily fluctuation caused by a mill dam above and shifting channel conditions at the station, mean monthly discharges have not been computed since 1904.[a]

The sloping staff gage is located 100 feet above the ferry at which discharge measurements are made. Owing to swiftness of current it has been impossible to make any measurements at high-water stages. The bed of the stream is sandy and changing, but rock shoals below control the water level at this station, and a good rating has been developed for low stages.

The following discharge measurement was made:

February 8, 1908: Width, 280 feet; area, 2,550 square feet; gage height, 7.17 feet; discharge, 4,060 second-feet.

[a] Records of discharge collected at the original Milledgeville station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1907 and 1908.

[Observer, Jesse Cummings.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	8.2	8.0	7.9	6.0	6.2	6.9	6.4	5.8	4.7	6.7	5.1	6.9
2	7.9	8.9	.....	6.0	6.1	6.9	6.0	5.6	4.6	6.0	5.0	6.5
3	7.7	8.0	.....	6.0	6.1	6.4	6.2	5.5	4.8	5.6	5.2	6.2
4	7.0	7.7	.....	5.9	6.3	6.0	6.6	5.4	6.0	5.4	5.1	6.0
5	6.7	.....	8.4	5.8	6.6	5.8	6.5	5.4	6.0	5.5	5.1	5.9
6	6.4	.....	7.4	6.0	6.3	5.7	6.2	5.2	5.8	5.4	5.2	5.9
7	6.3	9.0	7.0	6.0	6.1	5.6	5.8	5.3	5.4	5.2	5.1	5.8
8	6.2	8.2	6.8	6.3	6.0	5.4	5.5	5.2	6.1	5.0	5.1	5.8
9	6.2	7.1	6.6	6.3	7.0	5.4	5.4	5.2	6.3	5.4	5.0	5.8
10	6.1	6.8	6.5	6.0	6.4	5.4	5.2	5.5	5.9	5.4	5.3	6.4
11	6.1	6.7	6.4	6.0	6.0	5.3	5.2	5.8	5.6	5.2	5.9	6.5
12	6.0	6.6	6.4	5.8	6.0	5.4	5.2	5.2	5.3	5.2	6.0	6.4
13	6.0	6.4	6.3	5.8	6.0	5.6	5.6	6.3	5.0	5.0	5.8	6.4
14	6.0	6.4	6.3	5.8	6.0	6.6	5.8	5.5	5.0	5.0	5.5	.....
15	6.0	6.3	6.7	5.8	5.9	7.1	5.6	5.6	5.0	5.0	5.4	.....
16	5.9	6.2	6.8	5.8	6.1	6.4	5.6	6.8	4.9	5.1	5.3	8.2
17	5.9	6.2	6.6	6.6	6.0	5.6	5.7	6.8	4.9	5.1	5.3	7.2
18	5.9	6.1	6.4	6.8	6.0	5.5	5.5	6.5	4.8	5.1	5.4	7.4
19	6.0	6.1	6.3	6.6	5.8	5.4	5.6	7.0	4.9	5.1	5.7	6.8
20	6.0	6.2	6.3	6.2	5.7	5.4	5.5	6.0	4.8	5.0	6.0	6.4
21	6.0	6.4	6.2	6.1	5.6	5.3	5.6	5.5	4.8	5.0	6.4	6.2
22	6.0	6.2	6.2	6.6	5.5	5.3	5.4	5.4	4.8	4.9	7.4	6.3
23	5.9	6.2	6.1	8.8	5.5	5.3	5.1	5.4	5.5	5.0	.....	.....
24	5.8	6.0	6.1	8.4	5.4	5.3	5.1	5.3	8.4	5.1	.....	.....
25	5.8	6.3	6.0	8.0	5.5	5.4	5.1	5.3	7.3	5.1	8.2	.....
26	6.0	6.6	6.0	7.2	5.6	5.5	5.2	5.2	6.1	5.1	7.6	8.3
27	6.0	7.4	5.9	6.8	5.9	5.6	7.1	5.1	5.5	5.0	7.0	7.4
28	5.9	7.6	5.9	6.4	6.7	5.6	8.0	5.6	6.6	4.9	6.5	7.2
29	5.9	.....	5.9	6.3	6.0	8.5	8.2	5.1	.....	5.0	7.4	7.2
30	5.9	.....	5.9	6.2	5.6	8.3	7.9	4.9	8.0	5.2	7.4	.....
31	6.1	.....	5.8	.....	5.6	.....	7.0	4.8	.....	5.1	.....	.....
1908.												
1	.....	.....	6.9	7.1	7.8	6.3	5.6	5.4	6.5	5.5	6.6	5.8
2	8.2	.....	6.8	7.0	7.4	6.2	5.5	5.3	6.4	5.4	6.2	5.9
3	7.6	.....	6.7	7.0	7.2	5.9	6.1	5.2	6.2	5.4	6.0	5.9
4	7.2	9.0	6.7	6.8	7.0	5.9	7.0	5.2	6.2	5.4	6.0	5.8
5	7.4	7.6	6.7	6.6	6.9	6.2	7.7	6.2	6.2	5.3	7.0	5.8
6	8.2	7.6	6.7	6.7	6.8	6.3	7.2	8.0	7.6	5.3	7.0	5.8
7	.....	7.4	6.6	7.2	6.8	6.2	8.2	8.1	7.4	5.4	6.4	5.8
8	.....	7.2	6.6	7.0	6.8	6.0	8.0	8.2	7.0	5.5	6.2	6.6
9	9.0	7.0	6.5	6.7	7.0	5.8	7.6	7.2	6.4	5.6	6.0	7.0
10	7.8	9.0	6.5	6.6	6.8	5.8	7.6	8.6	6.2	5.6	5.8	6.8
11	9.0	.....	6.4	6.5	6.6	5.9	6.8	7.6	5.8	6.6	5.8	6.4
12	.....	.....	6.6	6.4	6.5	6.2	6.2	6.2	5.8	6.7	5.8	6.4
13	.....	.....	6.6	6.3	6.3	6.1	6.0	5.8	5.8	6.0	6.0	6.4
14	.....	.....	6.6	6.3	6.3	5.8	6.2	5.6	5.7	5.6	6.3	6.2
15	8.2	.....	6.5	9.0	6.2	5.7	6.2	5.5	5.7	5.6	7.0	6.0
16	7.6	.....	6.4	.....	6.2	6.4	5.8	5.5	5.6	5.6	6.8	6.0
17	7.2	.....	6.4	.....	6.2	6.5	5.7	5.4	5.6	5.5	6.3	6.0
18	7.1	.....	6.3	.....	6.4	6.2	5.7	5.4	5.5	5.5	6.1	5.9
19	6.9	.....	6.3	9.0	6.8	6.1	5.6	6.2	5.5	5.4	6.0	5.9
20	6.7	9.0	6.3	7.7	6.8	6.0	5.6	6.2	5.5	5.4	6.0	5.9
21	6.7	8.2	6.6	7.4	6.6	5.9	5.4	7.4	5.5	5.4	5.9	6.0
22	6.6	7.8	7.5	7.2	6.4	8.5	5.4	7.4	5.6	5.4	5.9	8.0
23	6.6	7.4	8.8	7.7	6.2	8.1	5.3	6.8	5.6	5.3	5.9	.....
24	6.5	7.2	.....	7.4	6.1	6.4	5.3	7.2	5.5	5.5	5.8	.....
25	6.5	7.2	.....	8.3	6.2	6.1	5.3	.....	5.5	5.6	5.9	.....
26	6.5	7.2	.....	.....	6.4	5.9	5.3	.....	5.5	5.6	5.8	8.0
27	6.4	7.4	.....	.....	6.3	5.8	5.3	.....	5.4	5.6	5.8	6.9
28	6.4	7.2	9.0	.....	6.2	5.8	5.3	.....	5.5	6.0	5.8	6.6
29	6.4	7.0	7.8	.....	6.1	5.7	5.3	.....	5.6	7.8	5.8	6.5
30	6.3	.....	7.4	.....	6.4	5.6	6.0	7.3	5.6	8.3	5.8	6.4
31	6.6	.....	7.2	.....	6.6	.....	5.7	6.8	.....	7.4	.....	6.4

NOTE.—The water surface was over the top of the gage for all missing days 1907 and 1908. The stage during these days was greater than 9 feet.

Rating table for Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1905 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
4.60	690	5.60	1,610	6.60	3,080	7.60	4,880
4.70	760	5.70	1,740	6.70	3,250	7.70	5,070
4.80	830	5.80	1,870	6.80	3,420	7.80	5,260
4.90	910	5.90	2,010	6.90	3,590	7.90	5,450
5.00	990	6.00	2,150	7.00	3,770	8.00	5,650
5.10	1,080	6.10	2,300	7.10	3,950	8.20	6,050
5.20	1,170	6.20	2,450	7.20	4,130	8.40	6,450
5.30	1,270	6.30	2,600	7.30	4,310	8.60	6,850
5.40	1,380	6.40	2,760	7.40	4,500	8.80	7,250
5.50	1,490	6.50	2,920	7.50	4,690	9.00	7,650

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on six discharge measurements made during 1904 to 1908, and is well defined between gage heights 4.3 feet and 8 feet. This table supersedes the 1905–6 rating table published in the 1906 report.

Monthly discharge of Oconee River at Fraleys Ferry, near Milledgeville, Ga., for 1905 to 1908.

[Drainage area, 2,840 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1905.						
October 20–31	870	600	770	0.271	0.12	A.
November 1–14	2,150	690	1,090	.384	.20	A.
1906.						
May 23–31	2,150	1,490	1,720	.606	.20	A.
June	15,000	1,380	4,380	1.54	1.72	B.
July	12,000	1,610	4,370	1.54	1.78	B.
August	7,250	1,380	3,700	1.30	1.50	A.
September	5,650	1,380	3,000	1.06	1.18	A.
October	10,000	1,610	3,220	1.13	1.30	A.
November	3,080	1,610	1,880	.662	.74	A.
December	4,880	1,610	2,460	.866	1.00	A.
1907.						
January	6,050	1,870	2,580	.908	1.05	A.
February	13,500	2,150	4,270	1.50	1.56	B.
March	10,500	1,870	3,520	1.24	1.43	A.
April	7,250	1,870	2,850	1.00	1.12	A.
May	3,770	1,380	2,160	.761	.88	A.
June	6,650	1,270	2,180	.768	.86	A.
July	6,050	1,080	2,240	.789	.91	A.
August	3,770	830	1,670	.588	.68	A.
September	9,000	690	2,080	.732	.82	A.
October	3,250	910	1,230	.433	.50	A.
November	13,000	990	2,850	1.00	1.12	A.
December	15,000	1,870	5,080	1.79	2.06	C.
The year	15,000	690	2,730	.959	12.99	
1908.						
January	14,000	2,600	5,420	1.91	2.20	C.
February	17,000	3,770	7,850	2.76	2.98	C.
March	21,000	2,600	5,270	1.86	2.14	C.
April	22,000	2,600	6,920	2.44	2.72	C.
May	5,260	2,300	3,090	1.09	1.26	A.
June	6,650	1,610	2,460	.866	.97	A.
July	6,050	1,270	2,480	.873	1.01	A.
August	30,000	1,170	5,950	2.10	2.42	C.
September	4,880	1,380	2,110	.743	.83	A.
October	6,250	1,270	1,990	.701	.81	A.
November	3,770	1,870	2,360	.831	.93	A.
December	14,000	1,870	3,630	1.28	1.48	A.
The year	30,000	1,170	4,130	1.45	19.75	

NOTE.—The discharge for days when the stage was above the top of the gage was estimated from the combined discharge at Greensboro and Buckhead.

OCONEE RIVER AT DUBLIN, GA.

The station is located at the iron highway bridge in the eastern part of Dublin. Continuous records of gage height have been obtained at this point since February 11, 1898. Gage heights are supplied by the United States Weather Bureau. Fragmentary records of gage heights and discharge measurements were obtained prior to 1898.

The datum of the staff gage, which is attached to the lower part of the Wrightsville and Tennile Railroad bridge 500 feet downstream from the highway bridge at which measurements are made, has remained the same since its establishment. The left bank overflows at a stage of about 20 feet for 1,100 feet through an iron frame trestle approach to the bridge. This ground is thickly covered with brushy growth which probably retards the flow of water over the overflow section. The right bank does not overflow. Conditions of flow are changeable, requiring frequent changes in ratings.

Only one discharge measurement was made during 1907 and 1908, and inasmuch as it indicates a radical change in the rating, monthly discharges are withheld pending further information.[a]

The following discharge measurement was made:

April 19, 1907: Width, 254 feet; area, 2,310 square feet; gage height, 5.08 feet; discharge, 7,080 second-feet.

Daily gage height, in feet, of Oconee River at Dublin, Ga., for 1907 and 1908.

[Observer, Mrs. Minnie E. Martin.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.5	1.7	5.2	0.7	3.0	1.0	6.0	5.4	−0.8	6.7	−1.0	6.7
2	4.8	3.7	5.8	.8	2.8	1.0	6.3	5.5	−1.1	7.0	−.9	6.2
3	5.7	6.5	6.0	1.0	2.5	4.0	4.9	3.5	−1.2	6.7	−.9	5.2
4	6.0	7.8	7.0	1.1	2.7	4.0	4.4	1.0	−1.4	3.0	−.9	4.5
5	6.5	8.5	7.8	1.2	3.0	1.3	3.3	1.0	.0	1.3	−.8	3.0
6	5.0	9.2	8.9	1.3	3.2	1.5	2.3	.8	.9	1.0	−.7	2.5
7	3.8	9.9	9.5	1.7	4.5	.9	2.5	.6	1.0	.7	−.7	2.0
8	3.0	10.3	9.3	2.2	2.6	.7	1.3	.5	.7	.5	−.6	1.9
9	2.6	13.0	6.5	3.0	2.0	.4	1.5	.5	.0	.4	−.6	1.7
10	2.5	13.5	4.0	3.2	6.2	.2	1.1	.0	1.6	.5	−.8	1.0
11	2.5	12.0	3.5	2.8	6.0	.1	.1	−.1	2.0	1.0	−.8	1.0
12	2.3	8.9	3.2	2.4	5.0	.0	−1.1	.5	2.6	.4	−.8	1.1
13	2.2	5.0	2.9	2.4	4.5	.0	−.1	1.0	1.2	.0	−1.0	1.2
14	2.0	4.4	2.7	1.5	3.2	.0	.0	1.0	.9	−.1	−.1	5.5
15	2.0	3.5	2.7	1.5	3.0	.8	1.0	2.6	.0	−.3	.7	8.8
16	2.0	3.1	3.5	1.5	2.7	3.0	1.5	1.5	−.4	−.3	.5	9.0
17	1.7	2.8	4.2	1.7	2.7	3.3	1.5	1.8	−.6	−.2	.4	10.3
18	1.5	3.6	3.5	3.5	2.0	1.5	1.1	3.6	−.8	−.3	.0	11.0
19	1.4	2.5	3.2	3.8	2.2	.5	.8	3.5	−.9	−.5	.1	11.3
20	1.4	2.7	3.0	5.5	2.0	.1	.5	3.0	−1.0	−.7	.1	9.5
21	1.6	3.0	2.6	4.5	1.8	−.1	.4	3.0	−1.1	−.8	1.0	9.1
22	1.3	3.0	2.5	4.2	1.0	−.2	.3	1.5	−1.2	−.8	2.2	4.1
23	1.3	4.0	2.1	5.0	1.0	−.3	.5	.5	−1.2	−.9	4.0	6.2
24	1.2	2.7	2.0	5.5	.9	−.4	.2	.0	−.5	−.7	6.6	9.0
25	1.1	2.5	1.7	6.2	.6	−.4	−.4	.0	−.2	−.6	7.2	10.0
26	1.5	2.5	2.5	7.5	.5	−.2	−.5	−.2	.5	−.6	8.5	11.9
27	1.7	3.1	1.1	10.7	.5	.0	−.6	−.5	4.0	−.8	8.0	16.0
28	1.9	4.0	1.0	8.5	1.0	.3	.7	−.5	5.0	−.9	10.0	16.1
29	2.0	.....	1.0	5.4	.9	2.0	.4	−.6	1.5	−.9	9.0	14.9
30	1.9	.....	1.0	4.8	2.5	3.8	4.2	−.7	6.0	−.9	6.4	14.5
31	2.0	.....	.7	.....	1.5	.....	6.5	−.8	.....	−1.0	.....	10.0

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Oconee River at Dublin, Ga., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	9.4	7.9	6.5	13.6	20.8	2.8	0.9	1.5	20.1	0.4	5.9	1.0
2	9.8	11.2	5.8	10.6	19.5	2.8	.8	.9	17.0	.5	4.8	.9
3	11.0	12.5	5.4	7.1	17.0	2.0	1.0	.2	12.1	.3	2.1	.9
4	12.0	13.1	5.1	5.8	14.6	1.9	.9	.1	5.2	−.1	1.9	1.1
5	12.2	18.5	5.0	5.1	11.1	1.5	2.7	.1	2.3	−.1	1.3	1.5
6	10.8	18.0	5.0	4.8	7.3	1.2	4.5	.2	1.8	−.2	3.0	1.6
7	11.2	16.0	4.9	5.3	6.0	2.9	5.0	3.2	3.5	−.2	4.0	1.4
8	11.5	13.0	4.6	6.0	5.5	2.5	4.9	5.0	4.7	−.2	3.5	1.0
9	9.8	10.9	4.5	5.3	5.2	2.0	6.0	5.7	4.4	.1	2.4	.9
10	11.5	9.0	4.3	5.5	5.1	1.2	6.1	5.9	3.5	.1	2.0	2.7
11	12.3	8.8	4.2	4.9	5.0	1.0	6.3	4.8	2.2	.1	1.5	3.4
12	14.5	8.7	3.7	4.1	4.4	.8	6.4	6.4	1.6	.8	1.5	2.9
13	14.0	12.8	3.7	3.5	3.8	1.8	4.4	6.0	1.3	2.5	1.2	2.4
14	13.5	16.4	3.7	3.3	3.5	1.9	4.0	3.4	1.0	2.1	1.1	3.8
15	12.5	17.5	3.7	4.3	3.2	1.5	3.2	1.2	.8	1.1	1.3	2.5
16	15.7	16.8	3.7	6.3	3.1	.9	3.3	.8	.6	.6	3.8	2.0
17	15.0	16.0	3.0	9.0	3.0	.8	2.8	.8	.5	.5	4.1	1.8
18	13.6	14.7	3.0	12.0	3.0	2.5	1.8	.5	.4	.4	3.1	1.7
19	11.4	14.6	3.0	15.5	3.0	2.8	1.0	.2	.3	.2	2.4	1.7
20	9.5	14.8	3.0	15.7	3.9	2.7	1.0	.7	.2	.1	1.9	1.6
21	7.5	14.3	2.9	14.6	4.5	2.0	1.7	1.2	.1	.1	1.5	1.5
22	6.7	13.8	2.9	13.0	4.3	1.9	.7	2.5	.2	.1	1.2	1.5
23	5.7	13.2	5.5	12.2	3.9	4.0	.4	4.2	.2	.1	1.3	2.7
24	5.0	12.1	10.5	11.5	3.1	6.1	.4	4.4	.2	.0	1.2	6.5
25	4.0	10.4	13.8	10.0	2.9	6.4	.4	4.5	.2	.0	1.1	7.2
26	4.5	8.2	17.0	10.0	2.3	3.9	.6	5.6	.1	.2	1.0	9.0
27	4.0	7.3	21.3	12.3	2.0	3.0	.3	7.0	.2	.3	1.2	10.0
28	4.3	6.8	21.4	15.7	2.3	2.1	.2	9.2	.3	.5	1.2	11.8
29	4.5	6.8	20.1	20.0	2.0	1.4	.2	19.0	.4	.9	1.0	11.0
30	4.0	.....	18.0	22.0	2.0	1.1	.2	23.2	.4	2.3	1.0	8.3
31	4.2	.....	16.0	.....	2.2	.....	.2	22.5	.....	5.3	.....	3.7

APALACHEE RIVER NEAR BUCKHEAD, GA.

The station is located at the iron wagon bridge over Apalachee River, about 3½ miles north of Buckhead, and about 3 miles below the mouth of Hard Labor Creek. It was established February 13, 1901, and was discontinued December 31, 1908.

The datum of the gage has remained the same since the establishment of the station. The right bank overflows at a stage of 10 feet for about 400 feet. The overflowed portion is thickly covered with trees and brushy growth, which greatly retards the flood water passing over it. The left bank does not overflow. Conditions of flow are fairly constant, and a fair rating has been developed at low and medium low stages.[a]

Discharge measurements of Apalachee River near Buckhead, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 16	M. R. Hall	86	331	3.25	611
November 27	do	86	387	3.26	578

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Apalachee River near Buckhead, Ga., for 1907 and 1908.

[Observer, G. A. J. Adams.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.4	4.8	6.0	2.4	2.6	5.5	2.55	2.2	1.0	3.0	1.65	3.4
2	5.1	5.7	7.1	2.5	2.7	4.0	2.25	2.15	.8	2.45	1.7	3.0
3	4.5	4.8	9.3	2.6	2.7	3.2	3.4	2.6	.9	2.2	1.6	2.85
4	3.7	3.6	8.0	2.5	2.8	2.5	6.5	2.75	2.9	2.1	1.6	2.55
5	3.5	8.0	5.4	2.6	4.6	2.3	4.3	2.3	2.1	2.05	1.65	2.4
6	3.1	10.9	3.9	2.6	3.1	2.2	3.0	2.0	1.95	1.95	1.65	2.35
7	2.9	7.0	3.6	2.7	2.9	2.1	2.0	2.1	1.9	1.5	1.65	2.3
8	2.8	5.2	3.4	3.0	2.7	2.1	1.9	1.9	2.1	2.0	1.6	2.2
9	2.8	4.0	3.4	3.2	2.9	2.0	1.9	2.0	1.9	2.3	1.6	3.4
10	2.85	3.6	3.2	2.8	2.7	1.8	1.8	3.7	1.85	1.9	1.65	3.0
11	2.8	3.4	3.1	2.65	2.7	1.7	1.75	2.05	1.6	1.8	1.85	2.9
12	2.7	3.2	3.0	2.55	2.6	2.6	1.9	1.4	1.6	1.75	2.0	2.8
13	2.55	3.1	3.0	2.5	2.5	3.5	1.85	1.85	1.45	1.8	2.2	3.2
14	2.55	2.95	2.95	2.65	2.45	5.0	2.5	1.75	1.3	1.1	1.7	6.0
15	2.6	2.85	3.3	2.6	2.5	4.3	1.9	3.3	1.15	1.9	1.5	5.5
16	2.55	2.7	3.4	2.55	2.45	3.8	2.45	3.6	.9	1.85	1.6	5.3
17	2.5	2.65	3.0	2.85	2.5	2.7	2.1	4.0	1.2	1.8	1.7	4.9
18	2.55	2.6	2.9	3.2	2.5	2.35	2.0	5.0	1.3	1.8	1.85	3.5
19	2.55	2.7	2.85	3.0	2.65	2.2	1.9	3.1	1.2	1.8	2.0	3.3
20	2.2	2.8	2.9	2.95	2.3	2.0	1.85	2.1	1.1	1.5	2.45	2.9
21	2.2	3.0	2.9	2.55	2.2	1.7	1.7	1.9	1.2	1.2	3.9	2.6
22	2.15	2.8	2.8	2.45	2.1	1.9	1.3	1.8	1.2	1.6	5.6	2.75
23	2.25	2.7	2.85	5.9	2.05	2.0	1.6	1.8	4.2	1.6	11.4	8.0
24	2.3	2.5	2.4	7.4	2.5	1.95	1.5	1.6	4.4	1.7	9.0	11.0
25	2.4	2.9	2.5	5.2	2.2	2.1	1.45	1.6	3.2	1.65	7.00	6.5
26	2.45	3.7	2.6	3.9	2.1	2.4	2.4	1.6	2.4	1.6	4.8	5.1
27	2.4	4.8	2.55	3.3	2.4	2.8	2.5	1.6	2.1	1.5	3.3	4.4
28	2.4	5.7	2.55	2.9	2.5	2.0	3.9	1.6	2.4	1.5	2.9	4.1
29	2.4	.....	2.5	2.85	2.3	3.9	6.2	1.55	6.8	1.7	3.4	4.5
30	2.4	.....	2.45	2.5	2.1	3.6	3.75	1.3	5.1	1.65	3.4	7.8
31	2.45	.....	2.4	.....	2.0	.....	2.4	1.2	.....	1.6	.....	10.0
1908.												
1	8.8	9.8	4.0	4.0	4.6	2.9	2.1	1.6	3.0	2.0	3.2	2.35
2	5.3	14.2	3.9	3.8	4.1	2.5	2.2	1.5	2.8	1.9	2.7	2.4
3	4.2	10.1	3.8	3.6	3.8	2.4	2.2	1.4	2.6	1.85	2.8	2.35
4	3.8	5.8	3.7	3.4	3.6	2.45	2.6	1.4	2.8	1.9	3.6	2.2
5	4.7	4.6	3.7	3.3	3.4	2.4	2.1	2.2	2.8	1.95	5.5	2.0
6	4.0	4.1	3.6	3.5	3.4	2.5	2.85	3.6	3.8	2.0	3.2	2.85
7	4.8	4.5	3.6	4.0	3.6	2.4	4.0	6.4	3.9	1.9	2.9	3.2
8	7.0	4.0	3.5	3.7	3.6	2.35	3.8	3.8	2.9	2.15	2.55	5.0
9	7.1	3.7	3.5	3.5	3.6	2.3	4.9	8.0	2.65	2.4	2.5	3.8
10	4.9	4.6	3.4	3.2	3.4	2.25	5.6	13.0	2.45	4.6	2.6	3.0
11	3.7	9.3	3.4	3.1	3.1	2.45	3.1	4.5	2.3	4.5	2.5	2.85
12	10.2	11.7	3.5	4.0	3.0	2.9	2.5	2.8	2.25	3.0	2.9	2.6
13	11.0	9.0	3.5	2.9	2.8	2.6	2.95	2.6	2.2	2.4	3.6	2.55
14	6.1	7.2	3.4	3.1	2.75	2.7	2.75	2.2	2.15	2.35	4.6	2.6
15	5.1	8.1	3.3	4.1	2.65	2.8	2.4	2.0	2.1	2.3	4.9	2.5
16	4.4	12.8	3.2	6.7	2.65	2.75	2.4	1.95	2.0	1.95	3.7	2.45
17	4.2	10.0	3.2	6.3	2.7	3.1	2.15	1.85	1.9	1.6	3.3	2.45
18	3.9	7.7	3.1	6.7	2.85	2.55	1.8	2.4	1.8	1.7	3.0	2.5
19	3.7	6.0	3.0	5.0	3.2	2.4	1.8	2.1	1.75	1.8	2.85	2.55
20	3.5	5.8	3.4	4.5	3.5	2.35	1.6	3.2	1.9	1.9	2.7	2.3
21	3.4	5.7	4.5	4.4	3.7	2.5	1.6	10.5	1.9	1.95	2.65	2.2
22	3.3	5.5	4.3	4.3	3.2	2.4	1.4	4.8	1.95	2.05	2.5	7.4
23	3.2	4.0	5.8	5.0	2.65	4.0	1.2	5.0	1.85	2.15	2.4	16.5
24	3.1	4.4	11.6	4.6	2.6	2.6	1.6	5.4	1.75	2.2	2.5	11.3
25	2.95	4.4	13.5	5.4	3.0	2.55	1.4	23.8	1.7	1.95	2.4	6.9
26	3.0	4.7	11.1	5.5	3.8	2.4	1.4	22.9	1.65	2.05	2.35	4.6
27	3.1	4.6	7.3	10.1	3.1	2.4	1.5	16.2	2.0	2.15	2.3	4.1
28	3.5	4.5	5.4	11.9	2.9	2.05	1.4	8.7	2.35	2.4	2.2	3.7
29	3.3	4.2	4.8	7.9	2.9	1.9	1.85	4.9	2.15	4.6	2.2	3.0
30	3.2	.....	4.4	5.5	3.4	1.8	2.2	4.6	2.1	7.2	2.2	3.85
31	3.6	.....	4.2	.....	4.0	.....	1.9	4.3	.....	4.5	.....	3.6

NOTE.—August 25, 1908, the highest stage reached was 27.5 feet, which is the highest recorded since the establishment of the station.

Rating table for Apalachee River near Buckhead, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	92	2.50	428	4.40	960	11.00	3,185
.90	108	2.60	453	4.60	1,020	12.00	3,535
1.00	124	2.70	478	4.80	1,080	13.00	3,885
1.10	141	2.80	504	5.00	1,140	14.00	4,235
1.20	158	2.90	530	5.20	1,202	15.00	4,585
1.30	176	3.00	557	5.40	1,265	16.00	4,935
1.40	194	3.10	584	5.60	1,329	17.00	5,285
1.50	213	3.20	611	5.80	1,394	18.00	5,635
1.60	232	3.30	639	6.00	1,460	19.00	5,985
1.70	252	3.40	667	6.20	1,526	20.00	6,335
1.80	272	3.50	695	6.40	1,592	21.00	6,685
1.90	293	3.60	723	6.60	1,659	22.00	7,035
2.00	314	3.70	752	6.80	1,727	23.00	7,385
2.10	336	3.80	781	7.00	1,795	24.00	7,735
2.20	358	3.90	810	8.00	2,135		
2.30	381	4.00	840	9.00	2,485		
2.40	404	4.20	900	10.00	2,835		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on discharge measurements made during 1901 to 1908, and is fairly well defined between gage heights 0.8 foot and 8 feet. Above about 15 feet the rating curve is approximate. Above gage height 8 feet the rating curve is a tangent, the difference being 35 per tenth.

Monthly discharge of Apalachee River near Buckhead, Ga., for 1907 and 1908.

[Drainage area, 440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	1,260	347	524	1.19	1.37	A.
February	3,150	428	896	2.04	2.12	A.
March	2,590	404	755	1.72	1.98	A.
April	1,930	404	601	1.37	1.53	A.
May	1,020	314	447	1.02	1.18	B.
June	1,300	252	507	1.15	1.28	A.
July	1,620	176	464	1.05	1.21	B.
August	1,140	158	384	.873	1.01	B.
September	1,730	92	375	.852	.95	B.
October	557	141	276	.627	.72	B.
November	3,320	213	621	1.41	1.57	A.
December	3,180	358	978	2.22	2.56	A.
The year	3,320	92	569	1.29	17.48	
1908.						
January	3,180	544	1,080	2.45	2.82	A.
February	4,300	752	1,730	3.93	4.24	A.
March	4,060	557	1,090	2.48	2.86	A.
April	3,500	530	1,140	2.59	2.89	A.
May	1,020	453	636	1.45	1.67	A.
June	840	272	437	.993	1.11	B.
July	1,330	158	417	.948	1.09	B.
August	7,660	194	1,510	3.43	3.95	A.
September	810	242	392	.891	.99	B.
October	1,860	232	469	1.07	1.23	B.
November	1,300	358	560	1.27	1.42	A.
December	5,110	314	871	1.98	2.28	A.
The year	7,660	158	861	1.96	26.55	

NOTE.—At times the accuracy of the above results may be more or less affected by daily fluctuations caused by stored water above.

OHOOPEE RIVER NEAR REIDSVILLE, GA.

This station is located at the wooden highway bridge known as Sheppards bridge, 4½ miles west of Reidsville. It is below Pendletons Creek and above Rocky Creek. It was established June 13, 1903, and was discontinued December 31, 1907.

The datum of the vertical staff gage, which is attached to the bridge from which discharge measurements are made, has remained the same since the establishment of the station. Conditions of flow are practically permanent at this point, and a good rating has been developed.[a]

The following discharge measurement was made:

April 18, 1907: Width, 109 feet; area, 529 square feet; gage height, 2.39 feet; discharge, 426 second-feet.

Daily gage height, in feet, of Ohoopee River near Reidsville, Ga., for 1907.

[Observer, J. D. Swain.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.7	2.1	4.1	1.5	7.6	2.8	6.0	4.5	1.8	16.5	2.2	4.1
2	3.0	2.4	4.1	2.0	6.6	2.6	6.9	5.2	1.7	13.4	2.3	4.4
3	3.0	2.5	4.3	2.4	5.9	2.5	7.1	5.3	1.5	11.9	2.4	4.5
4	2.9	2.6	4.8	2.5	5.6	2.2	8.9	6.0	1.6	11.0	2.5	4.5
5	2.8	3.6	4.6	2.6	5.0	2.1	11.0	6.7	1.7	10.1	2.7	4.4
6	2.3	4.6	4.2	2.3	4.6	2.0	10.7	6.1	1.6	9.4	2.6	4.4
7	2.0	5.2	3.8	2.6	4.2	1.8	9.5	6.0	1.7	8.5	2.4	4.3
8	1.8	6.3	3.4	2.8	4.5	1.6	8.7	5.7	1.6	7.6	2.3	4.3
9	2.1	6.2	3.2	3.0	4.8	1.5	8.4	5.2	1.6	7.1	2.2	4.5
10	2.1	5.8	3.0	2.7	5.2	1.4	7.4	4.5	1.3	7.0	2.2	4.8
11	1.8	5.2	2.8	2.6	5.8	1.3	6.9	4.3	1.2	7.1	2.2	5.2
12	1.8	5.1	2.7	2.9	5.8	1.5	4.7	4.2	1.3	6.8	2.2	5.3
13	1.9	5.0	2.5	3.1	5.8	1.6	3.7	5.2	2.0	6.1	2.4	5.2
14	2.1	4.8	2.5	3.1	5.9	1.3	3.6	6.4	2.9	5.7	2.8	6.3
15	1.7	3.6	2.4	3.1	6.1	1.4	3.4	6.8	3.6	5.4	2.9	7.5
16	1.6	4.6	2.4	2.8	7.3	1.5	3.3	7.5	4.4	5.1	2.8	8.1
17	1.5	4.0	2.5	2.6	7.3	1.6	3.6	7.6	4.5	4.8	2.8	8.4
18	1.6	3.6	2.5	2.4	7.0	1.5	3.9	7.0	4.6	4.4	2.7	9.3
19	1.5	3.5	2.7	2.6	6.4	1.5	4.3	6.6	3.3	4.1	2.6	10.8
20	1.5	3.6	2.9	3.6	5.6	1.3	4.7	6.1	3.0	3.8	2.9	11.6
21	1.4	3.8	3.1	3.8	4.8	1.1	4.5	5.7	2.9	3.4	2.8	11.1
22	1.5	4.2	3.2	4.0	4.3	1.1	4.2	5.1	3.0	3.2	2.7	10.4
23	1.5	4.0	3.2	4.4	3.8	.9	3.2	4.9	3.0	3.1	2.7	9.8
24	1.4	4.1	3.0	5.3	3.2	.8	2.8	4.6	3.1	3.0	2.9	9.8
25	1.3	4.4	2.8	5.7	3.8	.7	2.2	4.5	3.0	2.8	3.1	11.0
26	1.3	4.3	2.4	5.8	3.0	.6	3.1	4.4	2.8	2.6	3.2	11.2
27	1.9	4.2	2.3	5.9	2.7	.7	3.5	3.6	2.7	2.6	3.7	10.6
28	2.3	4.0	2.0	6.4	3.2	1.0	3.6	2.8	3.0	2.5	3.4	11.0
29	2.7	.....	1.8	7.2	3.5	3.7	3.7	2.3	7.8	2.4	3.3	11.2
30	2.6	.....	1.7	8.1	3.5	5.1	3.5	2.0	15.5	2.3	3.7	11.6
31	2.1	.....	1.6	.....	3.3	.....	4.1	1.9	.....	2.3	.....	11.0

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Rating table for Ohoopee River near Reidsville, Ga., for 1904 to 1907, inclusive.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.60	74	2.10	283	3.60	629	6.20	1,602
.70	83	2.20	302	3.70	659	6.40	1,685
.80	93	2.30	321	3.80	690	6.60	1,771
.90	104	2.40	341	3.90	722	6.80	1,860
1.00	115	2.50	361	4.00	755	7.00	1,950
1.10	127	2.60	382	4.20	824	8.00	2,430
1.20	140	2.70	403	4.40	895	9.00	2,950
1.30	153	2.80	425	4.60	968	10.00	3,500
1.40	167	2.90	447	4.80	1,043	11.00	4,120
1.50	182	3.00	470	5.00	1,120	12.00	4,820
1.60	197	3.10	494	5.20	1,198	13.00	5,590
1.70	213	3.20	519	5.40	1,277	14.00	6,440
1.80	230	3.30	545	5.60	1,357	15.00	7,340
1.90	247	3.40	572	5.80	1,438	16.00	8,290
2.00	265	3.50	600	6.00	1,520	17.00	9,290

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 30 discharge measurements made during 1903 to 1907, and is well defined.

Monthly discharge of Ohoopee River near Reidsville, Ga., for 1907.

[Drainage area, 1,280 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	470	153	270	0.211	0.24	B.
February	1,640	283	856	.669	.70	B.
March	1,040	197	494	.386	.44	B.
April	2,480	182	737	.576	.64	B.
May	2,230	403	1,170	.914	1.05	A.
June	1,160	74	239	.187	.21	B.
July	4,120	302	1,370	1.07	1.23	A.
August	2,230	247	1,220	.953	1.10	A.
September	7,820	140	708	.553	.62	B.
October	8,790	321	1,820	1.42	1.64	A.
November	659	302	413	.323	.36	B.
December	4,530	789	2,490	1.95	2.25	A.
The year	8,790	74	982	.768	10.48	

RIVER SURVEYS AND WATER POWER IN ALTAMAHA RIVER DRAINAGE BASIN.

Surveys have been made in the Altamaha drainage basin as follows:

South River from Constitution to mouth, near Worthville, Ga.[a] [b]

Ocmulgee River from junction of South and Yellow rivers to Macon, Ga.[a] [b]

Yellow River from mouth to Yellow River, Ga.[a]

Alcovy River from mouth to Dabneys Bridge near Starrsville, Ga.[a]

Towaliga River from mouth to High Falls, Ga.[a]

[a] Elevations taken on these surveys and brief statements regarding possible power development are given in Water resources of Georgia: Water Supply Paper U. S. Geol. Survey No. 197.

[b] River surveys and profiles of 1903: Water Supply Paper U. S. Geol. Survey No. 115.

Oconee and Middle Oconee rivers from Milledgeville to Gainesville Midland Railroad bridge near Watkinsville, Ga.[a]

Apalachee River from mouth to High Shoals at High Shoals, Ga.[a]

Mulberry Fork of Oconee River from mouth to Hoschton, Ga.[a]

Yellow River from mouth, near Worthville, to Yellow River, Ga.[b]

Alcovy River from mouth, near Worthville, to Dabneys Bridge, near Starrsville, Ga.[b]

Towaliga River from mouth, near Berner, to High Falls, Ga.[b]

SATILLO RIVER (OF GEORGIA) DRAINAGE BASIN.

MISCELLANEOUS MEASUREMENT.

The following miscellaneous discharge measurement was made of Satillo River at Macks Bridge, 2½ miles north of Waycross, Ga.:

August 17, 1908: Gage height, 2.95 feet; discharge, 87 second-feet.

ST. JOHNS RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

St. Johns River drains the northern half of the eastern coast of Florida and forms the outlet for an extensive system of lakes in the north central part of the State. It flows in a northerly direction, emptying into the Atlantic Ocean near Jacksonville.

An important feature of this basin is its underground flow, which in many places comes to the surface as very large springs.

The following gaging station has been maintained in this river basin:

Silver Spring at Silverspring, Fla., 1906–7.

SILVER SPRING AT SILVERSPRING, FLA.

Silver Spring forms the outlet for an underground stream or system of streams so large that steamboats run on the stream leading from it into the basin of the spring. This water flows eastward about 9 miles into the Oklawaha River, which has its source in a number of lakes in central Florida, and flows north for a considerable distance, then eastward into St. Johns River, which empties into the Atlantic Ocean.

On May 25, 1906, a station was established at Silverspring for the purpose of observing the amount and fluctuation of the flow from this remarkable spring. It was discontinued December 31, 1907.

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[a] Elevations taken on these surveys and brief statements regarding possible power development are given in Water resources of Georgia: Water Supply Paper U. S. Geol. Survey No. 197.

[b] River surveys and profiles of 1903: Water Supply Paper U. S. Geol. Survey No. 115.

The vertical staff gage is attached to a post in the basin and discharge measurements are made from a boat at a point on the outlet stream just below.

The bed of the stream is sandy and is covered with vegetation, making it difficult to measure. At the point usually measured the width is about 100 feet, with a depth of 10 feet.

The following discharge measurement was made:

February 11, 1907: Width, 120 feet; area, 855 square feet; gage height, 3.05 feet; discharge, 608 second-feet.

Daily gage height, in feet, of Silver Spring at Silverspring, Fla., for 1907.

[Observer, F. M. Brown.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.5	3.1	2.9	2.6	2.45	2.2	1.9	2.95	2.85	2.6	3.55	3.6
2	3.5	3.1	2.9	2.6	2.3	2.2	1.9	2.95	2.85	2.6	3.55	3.6
3	3.5	3.1	2.85	2.6	2.3	2.2	1.9	2.95	2.8	2.6	3.55	3.6
4	3.45	3.25	2.85	2.6	2.3	2.2	1.9	2.95	2.8	2.6	3.55	3.6
5	3.45	3.2	2.85	2.6	2.3	2.2	1.9	2.95	2.8	2.55	3.55	3.6
6	3.4	3.15	2.85	2.65	2.3	2.2	1.9	2.95	2.8	2.55	3.55	3.6
7	3.35	3.1	2.85	2.65	2.3	2.2	2.8	2.95	2.8	2.55	3.55	3.6
8	3.35	3.1	2.8	2.65	2.35	2.2	2.8	2.95	2.8	2.55	3.55	3.6
9	3.35	3.05	2.8	2.65	2.35	2.15	2.8	2.95	2.8	2.55	3.55	3.5
10	3.3	3.05	2.8	2.5	2.35	2.15	2.8	2.95	2.8	2.5	3.6	3.5
11	3.3	3.05	2.75	2.5	2.35	2.15	2.8	2.8	2.8	2.5	3.6	3.5
12	3.3	3.05	2.75	2.5	2.35	2.15	2.8	2.8	2.8	2.5	3.6	3.5
13	3.3	3.05	2.75	2.5	2.35	2.15	2.8	2.8	2.8	2.3	3.6	3.5
14	3.25	3.0	2.75	2.5	2.35	2.15	2.85	2.8	2.8	3.6	3.6	3.5
15	3.25	3.0	2.7	2.55	2.35	2.15	2.85	2.8	2.75	3.6	3.6	3.5
16	3.25	3.0	2.7	2.55	2.2	2.1	2.85	2.8	2.75	3.6	3.6	3.5
17	3.25	3.0	2.7	2.55	2.2	2.1	2.85	2.8	2.7	3.6	3.6	3.5
18	3.25	2.95	2.7	2.4	2.2	2.1	2.85	2.8	2.7	3.6	3.6	3.5
19	3.25	2.95	2.7	2.4	2.2	2.1	2.85	2.8	2.7	3.6	3.6	3.5
20	3.25	2.95	2.7	2.4	2.2	2.1	2.85	2.8	2.7	3.6	3.6	3.5
21	3.25	2.9	2.7	2.4	2.2	2.05	2.85	2.85	2.7	3.6	3.6	3.5
22	3.25	2.95	2.7	2.4	2.2	2.05	2.85	2.85	2.7	3.6	3.6	3.5
23	3.25	2.95	2.7	2.4	2.2	2.05	2.9	2.85	2.7	3.6	3.6	3.5
24	3.2	2.9	2.7	2.4	2.2	2.05	2.9	2.85	2.7	3.55	3.6	3.5
25	3.2	2.9	2.65	2.4	2.2	2.05	2.9	2.85	2.7	3.55	3.6	3.5
26	3.2	2.9	2.65	2.45	2.2	2.05	2.9	2.85	2.7	3.55	3.6	3.5
27	3.2	2.9	2.65	2.45	2.2	1.9	2.9	2.85	2.7	3.55	3.6	3.5
28	3.2	2.9	2.65	2.45	2.2	1.9	2.9	2.85	2.7	3.55	3.6	3.5
29	3.15	.....	2.6	2.45	2.2	1.9	2.9	2.85	2.7	3.55	3.6	3.55
30	3.15	.....	2.6	2.45	2.2	1.9	2.95	2.85	2.7	3.55	3.6	3.55
31	3.1	.....	2.6	.....	2.2	.....	2.95	2.85	.....	3.55	.....	3.55

MISCELLANEOUS MEASUREMENTS IN ST. JOHNS RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made on Oklawaha River during 1907:

February 9: Above mouth of Silver Spring Run, Silverspring, Fla.; gage height, 1.10 feet; discharge, 250 second-feet.

February 12: One-fourth mile below Paynes Landing, Fla.; gage height, 5.90 feet; discharge, 1,310 second-feet.

EASTERN GULF OF MEXICO DRAINAGE.

PEACE RIVER DRAINAGE BASIN.

MISCELLANEOUS MEASUREMENT.

The following miscellaneous discharge measurement was made on Peace River:

February 4, 1907, at the steel wagon bridge, 1 mile above Arcadia, Fla.: Gage height, 5.10 feet; discharge, 83 second-feet.

WITHLACOOCHEE RIVER (OF FLORIDA) DRAINAGE BASIN.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in Withlacoochee River drainage basin during 1907:

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
February 6	Withlacoochee River.	Gulf of Mexico	At iron bridge, ½ mile west of Dunnellon, Fla.	4.70	1,300
February 8	Blue Spring Run.	Withlacoochee River.	At wagon bridge, ¾ mile from Dunnellon, Fla.	6.12	847

SUWANEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Suwanee River and its principal tributary, Withlacoochee River of Georgia, drain a considerable area in the south-central portion of Georgia. These unite after passing into Florida and continue a southerly course to the Gulf of Mexico, about 10 miles north of Cedar Keys. The eastern branch, Suwanee River, drains a portion of the Okefinokee Swamp in Georgia, and Santa Fe River, a tributary from the east coming in lower down, drains the upper central portion of Florida lying west of St. Johns River.

The following gaging station has been maintained in this river basin:

Suwanee River at White Springs, Fla., 1906–1908.

SUWANEE RIVER AT WHITE SPRINGS, FLA.

The station is located at the county bridge in the town of White Springs, about 600 feet above the point where the flow of White Spring enters the river. It was established May 28, 1906, and was discontinued December 31, 1908.

The datum of the chain gage has remained the same since the establishment of the station. The river channel is cut through soft rock, but the bed is sandy and the flow is probably affected somewhat by the growth of moss and vegetation. An approximate rating has been developed.

Discharge measurements of Suwanee River at White Springs, Fla., in 1906 and 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1906.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 16	Warren E. Hall	88	397	2.68	154
May 28	do	131	1,860	15.67	5,350
1907.					
February 13	Warren E. Hall	85	356	2.50	93
Do	do	85	373	2.52	95
November 16	do	90	412	3.19	241

Daily gage height, in feet, of Suwanee River at White Springs, Fla., for 1907 and 1908.

[Observer, J. H. Hunt.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.7	2.6	2.5	2.2	3.9	2.6	4.7	3.3	9.4	12.9	4.3	3.1
2	2.7	2.6	2.5	2.2	3.8	2.7	4.2	3.3	8.9	12.9	4.1	3.1
3	2.7	2.6	2.5	2.2	3.7	2.8	3.6	3.2	8.4	12.9	4.0	3.1
4	2.7	2.6	2.5	2.2	3.5	2.9	3.9	3.3	8.0	13.0	3.9	3.1
5	2.7	2.6	2.5	2.2	3.3	3.0	5.5	3.5	7.9	12.9	3.8	3.1
6	2.7	2.6	2.5	2.2	3.2	2.9	6.7	4.1	7.9	12.6	3.7	3.1
7	2.8	2.6	2.5	2.3	3.2	2.7	6.7	5.3	7.8	12.5	3.6	3.1
8	2.7	2.6	2.5	2.4	3.1	2.6	5.8	5.9	7.7	12.5	3.5	3.2
9	2.7	2.6	2.5	2.5	3.0	2.5	5.1	6.7	7.5	12.2	3.5	3.4
10	2.7	2.6	2.5	2.6	2.9	2.4	4.7	7.3	7.8	12.4	3.5	5.3
11	2.7	2.6	2.5	2.6	2.8	2.3	4.4	8.6	7.8	12.2	3.4	8.0
12	2.7	2.6	2.5	2.7	2.8	2.2	4.1	9.3	7.6	11.7	3.4	8.2
13	2.7	2.5	2.5	2.8	2.9	2.1	3.9	9.8	7.5	11.3	3.4	7.9
14	2.7	2.5	2.5	2.7	2.9	2.1	3.7	10.5	8.3	10.9	3.3	16.0
15	2.7	2.5	2.5	2.7	3.0	2.0	3.5	10.7	8.4	10.4	3.3	18.3
16	2.7	2.5	2.5	2.7	3.1	2.0	3.4	10.3	8.4	10.0	3.2	17.5
17	2.7	2.5	2.4	2.7	3.1	2.0	4.1	10.2	8.5	9.6	3.2	17.0
18	2.7	2.5	2.4	2.8	3.4	2.0	5.6	9.9	8.6	9.0	3.2	17.0
19	2.7	2.5	2.4	2.9	3.3	2.0	6.0	9.6	8.6	8.4	3.2	17.2
20	2.6	2.5	2.4	3.2	3.2	1.9	5.7	9.9	8.7	8.0	3.1	17.4
21	2.6	2.5	2.4	3.4	3.1	1.9	5.2	10.2	8.6	7.5	3.1	17.6
22	2.6	2.5	2.4	3.6	3.0	1.9	4.8	10.6	8.6	7.0	3.1	18.2
23	2.6	2.5	2.4	4.2	2.9	1.9	4.3	11.1	8.7	6.7	3.1	18.9
24	2.6	2.5	2.4	4.2	2.9	1.9	3.8	11.4	8.7	6.3	3.0	19.7
25	2.6	2.5	2.3	4.2	2.9	1.9	3.6	11.4	8.7	6.0	3.0	19.8
26	2.6	2.5	2.3	4.1	2.8	1.9	3.5	11.2	8.6	5.7	3.0	19.9
27	2.6	2.5	2.3	4.1	2.7	1.9	3.4	11.1	8.5	5.4	3.0	20.0
28	2.6	2.5	2.3	4.1	2.6	1.9	3.3	10.7	9.3	5.1	3.0	20.2
29	2.6	.....	2.3	4.1	2.6	2.5	3.4	10.4	11.5	4.8	3.0	20.4
30	2.6	.....	2.3	4.1	2.6	3.3	3.5	10.1	12.7	4.6	3.0	20.6
31	2.6	.....	2.3	.....	2.6	.....	3.5	9.8	.....	4.5	.....	20.8
1908.												
1	20.9	12.5	14.8	4.2	3.4	3.2	3.8	6.8	3.1	4.2	2.7	2.5
2	20.9	13.1	14.1	4.2	3.4	3.3	3.8	6.6	3.1	4.2	2.7	2.5
3	20.7	12.8	13.5	4.0	3.4	3.4	3.8	6.4	3.0	4.0	2.7	2.5
4	20.5	12.4	12.7	4.0	3.5	3.4	3.8	6.1	3.0	4.0	2.7	2.5
5	20.2	12.2	12.1	3.9	3.6	3.4	3.8	5.8	3.0	3.9	2.6	2.5
6	19.9	12.1	11.5	3.9	3.7	3.4	3.8	5.5	3.1	3.9	2.6	2.5
7	20.3	12.1	11.0	3.8	3.8	3.3	3.8	5.2	3.1	3.8	2.6	2.4
8	20.7	12.0	10.5	3.7	3.9	3.3	3.9	4.9	3.1	3.8	2.6	2.4
9	20.3	11.9	10.0	3.6	4.0	3.3	3.9	4.7	3.1	3.7	2.6	2.4
10	19.8	11.9	9.6	3.5	4.1	3.2	3.9	4.6	3.2	3.5	2.6	2.4
11	19.4	11.9	9.1	3.5	4.2	3.2	4.0	4.5	3.2	3.4	2.6	2.4
12	20.4	12.1	8.7	3.4	4.2	3.2	4.4	4.4	3.3	3.3	2.6	2.4
13	20.7	12.2	8.3	3.4	4.3	3.1	5.5	4.3	3.3	3.3	2.6	2.4
14	20.5	13.3	7.9	3.3	4.3	3.1	6.5	4.1	3.2	3.2	2.6	2.4
15	20.3	15.8	7.7	3.2	4.3	3.1	7.0	4.0	3.2	3.2	2.7	2.4
16	20.2	16.5	7.3	3.2	4.3	3.1	7.2	3.9	3.2	3.1	2.7	2.3
17	20.0	16.8	7.0	3.1	4.3	3.0	7.3	3.8	3.1	3.1	2.7	2.3
18	19.9	17.1	6.8	3.1	4.3	3.0	7.3	3.7	3.1	3.0	2.8	2.3
19	19.6	17.5	6.5	3.1	4.3	3.2	7.3	3.6	3.1	3.0	2.8	2.3
20	19.3	17.8	6.3	3.1	4.2	3.3	7.6	3.5	3.1	3.0	2.8	2.3

Daily gage height, in feet, of Suwanee River at White Springs, Fla., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	18.9	17.9	6.0	3.1	4.1	3.3	7.9	3.4	3.1	3.0	2.8	2.3
22	18.5	17.9	5.8	3.1	4.0	3.4	8.3	3.2	3.1	3.0	2.7	2.3
23	18.0	17.7	5.7	3.1	3.9	3.5	8.5	3.2	3.1	3.0	2.7	2.3
24	17.4	17.5	5.6	3.1	3.8	3.6	8.4	3.2	3.1	2.9	2.7	2.3
25	16.8	17.2	5.5	3.1	3.7	3.8	8.4	3.1	3.1	2.9	2.7	2.3
26	16.1	17.0	5.4	3.0	3.6	4.0	8.1	3.1	3.1	2.8	2.6	2.3
27	15.5	16.5	5.3	3.0	3.5	4.1	7.8	3.1	3.4	2.8	2.6	2.3
28	14.8	16.0	5.0	3.0	3.4	4.1	7.6	3.1	3.7	2.7	2.6	2.3
29	14.3	15.4	4.8	3.1	3.3	4.0	7.5	3.1	4.1	2.7	2.6	2.3
30	13.7	.....	4.6	3.2	3.2	3.9	7.3	3.1	4.1	2.7	2.6	2.3
31	13.1	.....	4.4	.....	3.2	.....	7.0	3.1	.....	2.7	.....	2.3

Rating table for Suwanee River at White Springs, Fla., for 1906, 1907, and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.90	18	3.50	295	5.20	750	10.00	2,585
2.00	29	3.60	320	5.40	810	11.00	3,035
2.10	41	3.70	345	5.60	870	12.00	3,500
2.20	54	3.80	370	5.80	930	13.00	4,000
2.30	68	3.90	395	6.00	990	14.00	4,500
2.40	83	4.00	420	6.20	1,060	15.00	5,000
2.50	99	4.10	445	6.40	1,130	16.00	5,520
2.60	117	4.20	470	6.60	1,200	17.00	6,070
2.70	135	4.30	495	6.80	1,270	18.00	6,620
2.80	155	4.40	520	7.00	1,340	19.00	7,170
2.90	175	4.50	545	7.20	1,410	20.00	7,720
3.00	195	4.60	570	7.40	1,490	21.00	8,270
3.10	215	4.70	600	7.60	1,570	22.00	8,820
3.20	235	4.80	630	7.80	1,650	23.00	9,370
3.30	255	4.90	660	8.00	1,730	24.00	9,970
3.40	275	5.00	690	9.00	2,135		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on five discharge measurements made during 1906 and 1907, and is fairly well defined between gage heights 2.4 feet and 18 feet.

Monthly discharge of Suwanee River at White Springs, Fla., for 1906, 1907, and 1908.

Month.	Discharge in second-feet.			Accuracy.	Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.			Maximum.	Minimum.	Mean.	
1906.					1908.				
June	8,320	1,650	4,930	B.	January	8,220	4,050	7,050	B.
July	9,490	3,800	6,190	B.	February	6,560	3,450	4,900	B.
August	5,250	1,850	3,280	B.	March	4,900	520	1,920	B.
September	4,150	780	2,220	B.	April	470	195	281	B.
October	1,130	395	663	B.	May	495	235	383	B.
November	370	175	249	B.	June	445	195	281	B.
December	175	135	154	B.	July	1,930	370	1,100	B.
					August	1,270	215	503	B.
1907.					September	445	195	241	B.
January	155	117	129	B.	October	470	135	258	B.
February	117	99	107	B.	November	155	117	129	B.
March	99	68	87.9	C.	December	99	68	78.4	C.
April	470	54	214	B.					
May	395	117	208	B.	The year	8,220	68	1,430	
June	255	18	75.0	C.					
July	1,240	255	551	B.					
August	3,220	235	2,050	B.					
September	3,850	1,530	1,980	B.					
October	4,000	545	2,430	B.					
November	495	195	272	B.					
December	8,160	215	4,320	B.					
The year	8,160	18	1,040						

MISCELLANEOUS MEASUREMENTS IN SUWANEE RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in Suwanee River drainage basin during 1907:

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
February 16	Withlacoochee River of Georgia.	Suwanee River	At wagon bridge on road to Valdosta, Ga.	1.80	64
February 15	do	do	At wagon bridge ½ mile west of Ousley, Ga.	1.88	629
February 14	Little River	Withlacoochee River.	At wagon bridge 4 miles northwest of Valdosta, Ga.	3.33	598
February 13	White Springs	Suwanee River	At the spring near Suwanee River, White Springs, Fla.	1.46	72

OCKLOCKONEE RIVER DRAINAGE BASIN.

MISCELLANEOUS MEASUREMENT.

The following miscellaneous discharge measurement was made on Ocklockonee River:

June 12, 1908, at the wagon bridge one-half mile from Gibson, Fla.: Gage height, 3.34 feet; discharge, 158 second-feet.

APALACHICOLA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The Apalachicola basin is drained almost entirely by Chattahoochee and Flint rivers. These two main streams unite at the extreme southwest corner of Georgia to form the Apalachicola River, which flows south through Florida and empties into the Gulf of Mexico at Apalachicola.

Chattahoochee River rises in the Blue Ridge Mountains in Lumpkin, White, and Habersham counties, Ga., near the northeast corner of the State, and flows southwesterly until it reaches the Alabama line at West Point, Ga. Thence it flows in a southerly direction, forming the western boundary of Georgia, until it reaches Apalachicola River at the southern boundary of the State. Its upper tributaries are Soque and Chestatee rivers, which join the Chattahoochee in Habersham and Hall counties, respectively.

Flint River rises in Fulton County, Ga., a few miles south of Atlanta, and flows in a southerly direction to Apalachicola River. It drains the south central portion of Georgia, extending from Atlanta south to the Florida line. The principal tributaries of Flint River are Whitewater, Elkins, Big Potato, Muckalee, Kinchafoonee, Ichawaynochaway, and Spring creeks.

The mean annual rainfall for the basin is about 50 inches, except for the upper portion of the Chattahoochee drainage, where it reaches 60 inches.

The water-power opportunities of the basin are great, and in most portions the demand for power is good, making this basin an important one for water-power developments.

The following gaging stations have been maintained in this river basin:[a]

Chattahoochee River, Aerial, Ga., 1907–8.
Chattahoochee River, Leaf, Ga., 1907.
Chattahoochee River, Gainesville, Ga., 1901–1903.
Chattahoochee River, Buford, Ga., 1901.
Chattahoochee River, Norcross, Ga., 1902–1908.
Chattahoochee River, Oakdale, Ga., 1895–1904.
Chattahoochee River, West Point, Ga., 1896–1908.
Chattahoochee River, Alaga, Ala., 1908.
Soque River, Demorest, Ga., 1904–1908.
Sweetwater Creek, Austell, Ga., 1904–5.
Flint River, Woodbury, Ga., 1900–1908.
Flint River, Musella, Ga., 1907.
Flint River, Montezuma, Ga., 1905–1908.
Flint River, Albany, Ga., 1902–1908.
Flint River, Bainbridge, Ga., 1908.
Muckalee Creek, Albany, Ga., 1903.
Kinchafoonee Creek, Leesburg, Ga., 1905–1908.
Kinchafoonee Creek, Albany, Ga., 1903.
Ichawaynochaway Creek, Milford, Ga., 1905–1907.

CHATTAHOOCHEE RIVER NEAR AERIAL, GA.

The station is located at the highway bridge 2 miles south of Aerial, 7 miles west of Clarksville, and one-half mile above the mouth of Amy Creek. It was established July 16, 1907.

The datum of the vertical staff gage, which is located 200 feet below the bridge, has remained the same since the establishment of the station. A good rating has been developed for low stages.

Discharge measurements of Chattahoochee River near Aerial, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 16	B. M. Hall, jr	81	153	1.54	262
August 31	F. A. Murray	72	114	1.00	126
November 13	do	77	135	1.20	177

[a] Data collected in this drainage basin prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Chattahoochee River near Aerial, Ga., for 1907 and 1908.

[Observer, G. P. Smith.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.							1907.						
1	.....	1.1	0.9	1.25	0.95	1.4	16	1.5	1.3	1.0	1.0	1.1	2.0
2	.....	1.15	.9	1.2	1.5	1.4	17	1.4	1.1	.95	1.0	1.1	1.9
3	.....	1.1	.95	1.15	1.3	1.4	18	1.35	1.1	.9	1.0	1.4	1.8
4	.....	1.1	1.15	1.1	1.1	1.4	19	1.45	1.1	.9	1.0	1.4	1.75
5	.....	1.05	1.3	1.1	1.1	1.3	20	1.3	1.1	.9	.95	1.3	1.7
6	.....	1.15	1.0	1.05	1.1	1.3	21	1.2	1.1	.9	.95	3.0	1.65
7	.....	1.05	1.0	1.05	1.05	1.3	22	1.2	1.15	.9	.95	2.1	1.6
8	.....	1.05	.9	1.8	1.05	1.3	23	1.2	1.15	7.2	.95	4.1	3.8
9	.....	1.05	1.0	1.1	1.0	1.9	24	1.15	1.2	1.6	.95	3.3	2.4
10	.....	1.05	.95	1.1	1.3	3.0	25	1.2	1.1	1.2	.95	2.25	2.1
11	.....	1.05	1.4	1.05	1.4	2.0	26	1.15	1.0	1.2	.9	1.9	1.95
12	.....	1.2	1.0	1.0	1.2	1.75	27	1.15	1.0	1.1	1.1	1.7	1.85
13	.....	1.2	.95	1.0	1.2	1.65	28	1.1	1.0	1.3	1.05	1.6	1.9
14	.....	1.1	.95	1.0	1.15	3.1	29	1.15	1.0	1.2	1.05	1.55	2.0
15	.....	1.1	.9	1.0	1.1	2.3	30	1.4	1.0	1.35	1.0	1.5	6.5
							31	1.15	.95	.....	.95	.....	2.9

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	2.4	2.8	2.05	2.0	2.4	1.7	1.35	1.3	1.2	1.05	1.3	1.7
2	2.2	2.25	2.05	2.0	2.3	1.7	1.3	1.25	1.2	1.0	1.3	1.8
3	2.1	2.0	2.0	1.95	2.2	1.65	1.75	1.2	1.15	1.0	1.3	1.5
4	2.0	1.95	2.0	1.9	2.2	1.8	1.55	1.3	1.15	1.0	1.5	1.4
5	2.6	1.9	2.0	1.9	2.1	1.8	2.8	1.3	1.35	1.0	1.3	1.3
6	2.25	2.0	1.95	2.2	2.1	1.65	2.1	1.6	1.8	1.0	1.25	1.3
7	2.2	1.9	1.9	2.0	3.0	1.6	2.15	1.4	1.4	1.0	1.2	8.9
8	2.05	1.9	1.9	1.9	2.3	1.6	2.2	1.3	1.3	1.0	1.2	2.8
9	1.95	1.8	1.9	1.9	2.2	1.6	2.95	1.4	1.25	1.1	1.2	2.2
10	1.9	2.4	1.85	1.85	2.2	1.55	2.3	1.3	1.2	1.7	1.15	1.9
11	1.9	2.9	1.85	1.8	2.1	1.9	1.95	1.3	1.2	1.2	1.2	1.8
12	3.7	2.8	2.1	1.8	2.1	1.6	1.8	1.2	1.2	1.15	1.2	1.85
13	2.7	2.7	1.9	1.8	2.0	1.55	1.7	1.2	1.15	1.1	1.15	1.7
14	2.4	2.7	1.9	1.8	2.0	2.2	1.65	1.2	1.15	1.1	1.2	1.6
15	2.2	9.0	1.85	2.9	1.95	1.8	1.6	1.2	1.1	1.1	1.25	1.5
16	2.1	3.5	1.8	2.6	1.9	1.6	1.6	1.2	1.1	1.05	1.2	1.5
17	2.1	2.95	1.7	2.35	1.9	1.6	1.5	1.2	1.1	1.05	1.2	1.5
18	2.1	2.7	1.8	2.2	1.9	1.6	1.5	1.25	1.1	1.0	1.2	1.45
19	2.0	2.75	1.75	2.6	2.2	1.6	1.4	1.4	1.1	1.0	1.15	1.45
20	1.9	2.5	2.05	2.3	2.0	1.5	1.4	1.4	1.1	1.0	1.15	1.4
21	1.9	2.4	2.35	2.2	1.9	1.5	1.35	1.2	1.1	1.0	1.15	1.4
22	1.9	2.35	2.0	2.1	1.85	1.7	1.35	2.45	1.1	1.0	1.1	3.9
23	1.8	2.25	5.8	2.05	1.8	1.6	1.3	1.6	1.1	2.45	1.1	2.4
24	1.75	2.2	4.1	2.0	1.9	1.5	1.4	1.8	1.05	1.65	1.15	2.0
25	1.8	2.2	2.8	9.8	1.85	1.5	1.4	1 8	1.05	1.35	1.2	1.8
26	1.9	2.35	2.5	3.5	1.8	1.4	1.4	1.5	1.05	1.25	1.2	1.75
27	2.0	2.2	2.3	3.0	1.8	1.4	1.3	1.6	1.05	1.2	1.15	1.7
28	1.9	2.1	2.2	2.65	1.8	1.4	1.3	1.4	1.2	1.25	1.2	1.6
29	2.0	2.1	2.15	2.5	1.8	1.4	1.4	1.3	1.1	2.2	1.1	1.6
30	1.8	.....	2.1	2.4	1.8	1.35	1.4	1.3	1.1	1.6	1.1	1.55
31	1.8	.....	2.05	.....	1.75	.....	1.3	1.25	.....	1.4	.....	1.65

Daily discharge, in second-feet, of Chattahoochee River near Aerial, Ga., for 1907 and 1908.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.							1907.						
1	.....	150	110	182	120	220	16	250	195	130	130	150	420
2	.....	160	110	170	250	220	17	220	150	120	130	150	380
3	.....	150	120	160	195	220	18	208	150	110	130	220	345
4	.....	150	160	150	150	220	19	235	150	110	130	220	328
5	.....	140	195	150	150	195	20	195	150	110	120	195	310
6	.....	160	130	140	150	195	21	170	150	110	120	.....	295
7	.....	140	130	140	140	195	22	170	160	110	120	.....	280
8	.....	140	110	345	140	195	23	170	160	.....	120	.....	.....
9	.....	140	130	150	130	380	24	160	170	280	120	.....	.....
10	.....	140	120	150	195	.....	25	170	150	170	120	.....	.....
11	.....	140	220	140	220	420	26	160	130	170	110	380	400
12	.....	170	130	130	170	328	27	160	130	150	150	310	362
13	.....	170	120	130	170	295	28	150	130	195	140	280	380
14	.....	150	120	130	160	.....	29	160	130	170	140	265	420
15	.....	150	110	130	150	.....	30	220	130	208	130	250	.....
							31	160	120	.....	120	.....	.....

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	.....	.....	.....	420	.....	310	208	195	170	140	195	310
2	.....	.....	.....	420	.....	310	195	182	170	130	195	345
3	.....	420	420	400	.....	295	328	170	160	130	195	250
4	420	400	420	380	.....	345	265	195	160	130	250	220
5	.....	380	420	380	.....	345	.....	195	208	130	195	195
6	.....	420	400	.....	.....	295	.....	280	345	130	182	195
7	.....	380	380	420	.....	280	.....	220	220	130	170	.....
8	.....	380	380	380	.....	280	.....	195	195	130	170	.....
9	400	345	380	380	.....	280	.....	220	182	150	170	.....
10	380	.....	362	362	.....	265	.....	195	170	310	160	380
11	380	.....	362	345	.....	380	400	195	170	170	170	345
12	.....	.....	.....	345	.....	280	345	170	170	160	170	362
13	.....	.....	380	345	420	265	310	170	160	150	160	310
14	.....	.....	380	345	420	.....	295	170	160	150	170	280
15	.....	.....	362	.....	400	345	280	170	150	150	182	250
16	.....	.....	345	.....	380	280	280	170	150	140	170	250
17	.....	.....	310	.....	380	280	250	170	150	140	170	250
18	.....	.....	345	.....	380	280	250	182	150	130	170	235
19	420	.....	328	.....	.....	280	220	220	150	130	160	235
20	380	.....	.....	.....	420	250	220	220	150	130	160	220
21	380	.....	.....	.....	380	250	208	170	150	130	160	220
22	380	.....	420	.....	362	310	208	.....	150	130	150	.....
23	345	.....	.....	.....	345	280	195	280	150	.....	150	.....
24	328	.....	.....	420	380	250	220	345	140	295	160	420
25	345	.....	.....	.....	362	250	220	345	140	208	170	345
26	380	.....	.....	.....	345	220	220	250	140	182	170	328
27	420	.....	.....	.....	345	220	195	280	140	170	160	310
28	380	.....	.....	.....	345	220	195	220	170	182	170	280
29	420	.....	.....	.....	345	220	220	195	150	.....	150	280
30	345	.....	.....	.....	345	208	220	195	150	280	150	265
31	345	.....	.....	.....	328	.....	195	182	.....	220	.....	295

NOTE.—Daily discharge for 1907 and 1908 based on a well-defined rating curve. Beginning July 16, 1907, the discharge was greater than 450 second-feet for all missing days.

CHATTAHOOCHEE RIVER NEAR LEAF, GA.

The station is located at a covered wagon bridge known as Blacks Bridge, 1 mile from Leaf and about 4 miles above the mouth of Soque River, and 1 mile below Blue Creek. It was established May 8, 1907, and was discontinued December 31, 1907.

The vertical staff gage is attached to the bridge from which discharge measurements are made. The bottom of the river is composed of rock and is rough. The current is swift and considerably broken, especially at low water. A fairly good rating has been developed for low stages.

Discharge measurements of Chattahoochee River near Leaf, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 8	F. A. Murray	111	197	1.42	438
June 15	do	91	139	1.21	267
July 16	do	113	175	1.40	367
August 31	do	71	114	.79	159
November 13	do	95	118	1.02	203

Daily gage height, in feet, of Chattachooche River near Leaf, Ga., for 1907.

[Observer, J. A. Black.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						2.6	1.05	0.9	0.75	1.05	0.8	1.2
2						1.65	1.05	.9	.75	1.0	1.25	1.2
3						1.5	1.1	.9	1.2	.95	1.0	1.1
4						1.4	1.8	.9	.95	.95	1.0	1.1
5						1.35	1.3	.9	1.05	.9	.9	1.1
6						1.3	1.15	.95	.8	.9	.9	1.1
7						1.25	1.1	.9	.8	.9	.9	1.05
8					1.4	1.3	1.05	.85	.8	1.35	.85	1.05
9					1.45	1.35	1.0	.85	.8	.95	.85	1.5
10					1.35	1.25	1.0	.85	.75	.9	1.6	2.5
11					1.55	1.25	1.0	.85	1.2	.9	1.2	1.7
12					1.4	1.2	1.0	1.05	.8	.85	1.05	1.5
13					1.35	1.2	1.5	.95	.8	.85	1.0	1.4
14					1.3	1.3	1.1	.9	.8	.85	1.0	2.5
15					1.5	1.2	1.2	.9	.75	.85	.95	1.9
16					1.5	1.2	1.55	1.1	.8	.85	.9	1.7
17					1.4	1.15	1.15	.95	.8	.8	.9	1.55
18					1.35	1.1	1.1	1.1	.75	.85	1.2	1.5
19					1.3	1.3	1.2	.95	.75	.8	1.2	1.4
20					1.3	1.2	1.1	.9	.7	.8	1.1	1.4
21					1.3	1.15	1.0	.9	.7	.8	2.25	1.35
22					1.25	1.1	1.0	.95	.7	.8	1.8	1.3
23					1.25	1.2	1.0	.95	3.8	.8	3.4	2.7
24					1.3	1.25	.95	1.0	1.4	.8	2.7	2.0
25					1.35	1.1	1.0	.9	1.1	.8	1.9	1.75
26					1.45	1.1	.95	.85	1.0	.8	1.6	1.6
27					1.3	1.1	.9	.8	.95	.95	1.4	1.55
28					1.25	1.1	.95	.8	1.15	.9	1.35	1.6
29					1.2	1.25	.95	.8	1.45	.85	1.3	1.45
30					1.25	1.1	1.3	.8	1.2	.8	1.2	5.1
31					1.6		.95	.8		.8		2.3

Daily discharge, in second-feet, of Chattahoochee River near Leaf, Ga., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	.....	.....	.....	229	184	149	229	160	286
2	.....	.....	.....	.....	.....	595	229	184	149	212	310	286
3	.....	.....	.....	.....	.....	460	246	184	286	198	212	246
4	.....	.....	.....	.....	.....	390	760	184	198	198	212	246
5	.....	.....	.....	.....	.....	362	333	184	229	184	184	246
6	.....	.....	.....	.....	.....	333	266	198	160	184	184	246
7	.....	.....	.....	.....	.....	310	246	184	160	184	184	229
8	.....	.....	.....	.....	390	333	229	172	160	362	172	229
9	.....	.....	.....	.....	425	362	212	172	160	198	172	460
10	.....	.....	.....	.....	362	310	212	172	149	184	545	.....
11	.....	.....	.....	.....	502	310	212	172	286	184	286	645
12	.....	.....	.....	.....	390	286	212	229	160	172	229	460
13	.....	.....	.....	.....	362	286	460	198	160	172	212	390
14	.....	.....	.....	.....	333	333	246	184	160	172	212	.....
15	.....	.....	.....	.....	460	286	286	184	149	172	198	.....
16	.....	.....	.....	.....	460	286	502	246	160	172	184	645
17	.....	.....	.....	.....	390	266	266	198	160	160	184	502
18	.....	.....	.....	.....	362	246	246	246	149	172	286	460
19	.....	.....	.....	.....	333	333	286	198	149	160	286	390
20	.....	.....	.....	.....	333	286	246	184	138	160	246	390
21	.....	.....	.....	.....	333	266	212	184	138	160	.....	362
22	.....	.....	.....	.....	310	246	212	198	138	160	760	333
23	.....	.....	.....	.....	310	286	212	198	.....	160	.....	.....
24	.....	.....	.....	.....	333	310	198	212	390	160	.....	.....
25	.....	.....	.....	.....	362	246	212	184	246	160	.....	702
26	.....	.....	.....	.....	425	246	198	172	212	160	545	545
27	.....	.....	.....	.....	333	246	184	160	198	198	390	502
28	.....	.....	.....	.....	310	246	198	160	266	184	362	545
29	.....	.....	.....	.....	286	310	198	160	425	172	333	425
30	.....	.....	.....	.....	310	246	333	160	286	160	286	.....
31	.....	.....	.....	.....	545	.....	198	160	.....	160	.....	.....

NOTE.—Daily discharge based on a well-defined rating curve. Beginning May 8 the discharge was greater than 860 second-feet for all missing days.

CHATTAHOOCHEE RIVER NEAR NORCROSS, GA.

The station is located at Medlocks Bridge, about 4½ miles north of Norcross, 1½ miles above the mouth of John Creek, and 5 miles below the mouth of Sewanee Creek. This station was established June 10, 1902, to take the place of the Oakdale station, about 30 miles below, which was maintained from July 30, 1896, to May 31, 1904, when its records become unreliable on account of the Bull Sluice power plant above.

The datum of the vertical staff gage and the chain gage, which have been used at this point, have remained the same since the establishment of the station. The right bank is high and only overflows slightly. The left bank will overflow for about 800 feet at a gage height of 16 to 18 feet. The bed of the stream is sandy and changeable, necessitating occasional changes in the rating. Fairly good ratings have been developed for 1907 and 1908.[a]

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Discharge measurements of Chattahoochee River near Norcross, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 2	M. R. Hall	186	2,340	8.50	9,880
Do	do	186	2,370	8.75	10,200
July 6	M. R. Hall and B. M. Hall, jr	170	1,110	2.61	1,670
1908.					
January 16	M. R. Hall and W. E. Hall	173	1,480	4.00	3,140
October 30	M. R. Hall	177	1,430	4.30	3,180
Do	do	187	1,430	4.30	3,110

Daily gage height, in feet, of Chattahoochee River near Norcross, Ga., for 1907 and 1908.

[Observer, W. O. Medlock.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	9.3	3.35	4.6	3.15	3.05	4.4	2.3	2.2	1.7	2.5	1.75	2.8
2	5.6	4.4	8.6	3.1	3.0	5.0	2.2	2.05	1.65	2.2	2.0	2.65
3	4.7	4.0	7.8	2.9	2.9	3.45	2.2	2.0	1.7	2.1	2.5	2.55
4	4.4	4.4	5.0	2.8	3.5	3.1	2.6	1.95	3.25	2.0	2.5	2.5
5	4.0	6.3	4.2	2.8	3.3	2.9	3.9	1.9	2.5	2.0	2.1	2.4
6	3.9	4.8	3.9	3.0	2.95	2.75	2.6	1.9	2.35	1.95	1.95	2.4
7	3.75	4.0	3.65	3.35	3.25	2.65	2.3	2.35	2.0	1.9	1.88	2.35
8	3.65	3.75	3.6	3.1	3.7	2.6	2.2	1.95	1.85	1.95	1.9	2.3
9	3.6	3.55	3.65	3.0	3.35	2.8	2.1	1.9	1.8	2.0	1.88	2.5
10	3.55	3.45	3.45	2.95	3.15	2.8	2.1	2.05	1.8	2.0	2.4	4.4
11	3.5	3.35	3.45	2.85	3.15	2.6	2.2	1.9	2.5	1.88	3.65	5.0
12	3.45	3.25	3.35	3.0	3.25	2.5	2.2	2.0	2.2	1.85	2.8	3.55
13	3.4	3.25	3.3	3.1	3.0	2.8	2.4	2.4	1.85	1.8	2.35	3.2
14	3.35	3.15	3.3	2.9	2.9	2.85	2.7	2.5	1.7	1.72	2.2	4.0
15	3.3	3.15	3.5	2.8	3.35	2.7	2.3	2.9	1.7	1.8	2.15	4.9
16	3.25	3.05	3.45	2.8	3.6	2.5	2.6	2.85	1.7	1.8	2.0	3.85
17	3.25	3.05	3.2	2.9	3.2	2.4	2.8	2.6	1.7	1.75	2.05	3.4
18	3.2	3.05	3.2	2.85	2.95	2.35	2.7	2.15	1.7	1.75	2.2	3.2
19	3.2	3.0	3.15	2.95	2.8	2.35	3.0	2.4	1.7	1.68	2.6	3.1
20	3.3	3.1	3.1	3.4	2.75	2.45	2.75	2.3	1.6	1.8	2.5	2.95
21	3.4	3.0	3.1	2.9	2.7	2.5	2.25	2.2	1.6	1.62	3.7	2.8
22	3.15	3.0	3.0	3.1	2.7	2.3	2.1	2.0	1.65	1.75	5.0	2.75
23	3.15	2.9	3.0	6.8	2.6	2.4	2.0	2.3	3.55	1.75	5.2	6.0
24	3.1	2.95	2.95	5.7	2.85	2.7	1.95	2.55	5.8	1.7	9.2	6.4
25	3.05	3.5	2.9	4.0	2.75	2.6	1.95	2.15	2.8	1.75	6.1	4.2
26	3.1	4.2	2.9	3.6	2.9	2.4	1.9	1.95	2.3	1.65	4.0	3.7
27	3.2	5.3	2.9	3.35	3.9	2.3	2.95	1.85	2.05	1.82	3.4	3.45
28	3.05	4.2	2.9	3.25	3.0	2.5	2.3	1.8	2.95	1.85	3.1	3.3
29	3.05	.....	2.9	3.2	2.7	2.65	2.15	1.8	3.5	2.1	3.4	3.4
30	3.0	.....	2.8	3.15	2.6	2.4	2.2	1.8	3.1	1.82	3.1	6.4
31	3.05	.....	2.8	.....	2.85	.....	3.45	1.7	.....	1.78	.....	12.4
1908.												
1	6.0	5.8	3.8	4.0	4.6	3.15	2.5	2.2	2.25	1.9	2.6	2.3
2	4.6	6.3	3.7	3.95	4.4	3.1	2.5	2.15	2.2	1.9	2.45	2.45
3	4.1	4.4	3.7	3.85	4.2	3.0	2.65	2.1	2.2	1.88	2.65	2.65
4	3.75	3.9	3.7	3.7	4.1	3.15	3.55	2.1	2.1	1.85	3.55	2.5
5	5.0	3.65	3.6	3.7	4.1	3.3	4.4	2.45	3.5	1.8	3.1	2.35
6	5.0	3.7	3.6	4.2	4.2	3.2	4.7	3.85	5.6	1.8	2.65	2.3
7	4.4	3.65	3.6	4.3	6.7	3.05	3.6	3.2	3.4	1.8	2.45	6.2
8	4.2	3.45	3.5	3.9	5.8	3.0	3.5	3.1	2.6	1.8	2.4	11.4
9	3.75	3.35	3.5	3.75	4.4	2.9	3.35	3.8	2.35	2.5	2.3	5.3
10	3.55	4.1	3.4	3.7	4.2	2.9	4.2	2.8	2.25	4.4	2.3	3.85
11	4.6	9.2	3.45	3.6	4.0	3.1	3.5	2.45	2.2	3.55	2.25	3.4
12	9.0	7.8	3.7	3.55	3.85	3.15	3.05	2.3	2.2	2.6	2.2	3.55
13	7.0	5.8	3.8	3.45	3.8	2.9	2.85	2.2	2.15	2.25	2.25	3.4
14	5.0	5.3	3.55	3.4	3.7	4.0	2.8	2.2	2.1	2.1	2.35	3.05
15	4.3	10.2	3.4	4.4	3.65	4.1	2.7	2.1	2.1	2.1	2.4	2.9

Daily gage height, in feet, of Chattahoochee River near Norcross, Ga., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	4.0	11.4	3.4	6.5	3.6	3.35	2.6	2.1	2.0	2.05	2.45	2.8
17	3.9	6.6	3.3	6.2	3.85	3.0	2.6	2.2	2.0	2.0	2.3	2.7
18	3.75	5.4	3.3	5.1	3.75	2.95	2.5	2.6	2.0	2.0	2.2	2.65
19	3.6	5.4	3.3	6.0	4.3	3.0	2.4	2.6	2.0	1.95	2.35	2.6
20	3.5	5.4	3.8	5.2	4.2	2.9	2.4	2.95	2.0	1.98	2.4	2.7
21	3.4	4.8	5.4	4.5	3.65	3.0	2.3	2.4	2.0	1.98	2.2	2.8
22	3.35	4.4	4.6	4.2	3.5	3.4	2.3	4.3	2.0	1.95	2.15	5.8
23	3.3	4.2	7.4	4.1	3.45	3.45	2.25	4.5	2.0	2.05	2.15	7.8
24	3.25	4.2	12.2	3.9	3.4	3.05	2.25	4.95	2.0	3.7	2.2	4.6
25	3.15	4.0	10.2	9.7	3.65	3.1	2.3	4.45	1.9	3.0	2.2	3.7
26	3.1	4.2	6.0	13.6	3.4	2.8	2.3	4.1	1.9	2.45	2.2	3.35
27	3.25	4.2	5.2	7.4	3.9	2.7	2.3	3.0	1.9	2.3	2.05	3.15
28	3.25	3.95	4.8	5.8	3.45	2.6	2.2	2.7	1.95	2.4	2.05	3.0
29	3.2	3.85	4.4	5.1	3.4	2.6	2.4	2.5	2.05	3.7	2.2	2.9
30	3.2	.....	4.2	4.8	3.4	2.55	2.4	2.4	2.05	4.2	2.05	3.0
31	3.2	.....	4.1	.....	3.3	.....	2.3	2.3	.....	3.1	.....	3.2

Rating tables for Chattahoochee River near Norcross, Ga.

FOR 1907.[a]

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	750	3.00	2,100	4.40	3,740	6.60	6,720
1.70	830	3.10	2,210	4.50	3,860	6.80	7,005
1.80	910	3.20	2,320	4.60	3,980	7.00	7,295
1.90	990	3.30	2,430	4.70	4,110	7.20	7,585
2.00	1,080	3.40	2,540	4.80	4,240	7.40	7,885
2.10	1,170	3.50	2,660	4.90	4,370	7.60	8,185
2.20	1,260	3.60	2,780	5.00	4,500	7.80	8,495
2.30	1,360	3.70	2,900	5.20	4,760	8.00	8,805
2.40	1,460	3.80	3,020	5.40	5,040	9.00	10,440
2.50	1,560	3.90	3,140	5.60	5,320	10.00	12,155
2.60	1,660	4.00	3,260	5.80	5,600	11.00	13,920
2.70	1,770	4.10	3,380	6.00	5,880	12.00	15,760
2.80	1,880	4.20	3,500	6.20	6,160	13.00	17,700
2.90	1,990	4.30	3,620	6.40	6,440	14.00	19,650

FOR 1908.[b]

1.80	765	3.10	1,980	4.40	3,435	6.40	6,240
1.90	850	3.20	2,080	4.50	3,555	6.60	6,550
2.00	940	3.30	2,185	4.60	3,680	6.80	6,860
2.10	1,030	3.40	2,290	4.70	3,805	7.00	7,180
2.20	1,120	3.50	2,400	4.80	3,935	7.20	7,500
2.30	1,210	3.60	2,510	4.90	4,065	7.40	7,820
2.40	1,300	3.70	2,625	5.00	4,200	7.60	8,140
2.50	1,395	3.80	2,740	5.20	4,470	7.80	8,460
2.60	1,490	3.90	2,855	5.40	4,750	8.00	8,785
2.70	1,585	4.00	2,970	5.60	5,035	9.00	10,440
2.80	1,680	4.10	3,085	5.80	5,325		
2.90	1,780	4.20	3,200	6.00	5,625		
3.00	1,880	4.30	3,315	6.20	5,930		

[a] The above table is not applicable for obstructed-channel conditions. It is based on discharge measurements made during 1904 to 1907, and is well defined.

[b] The above table is not applicable for obstructed-channel conditions. It is based on three discharge measurements made during 1908, two measurements made during 1909, and nine measurements made during earlier years above gage height 6 feet. It is well defined. Above gage height 9 feet this table is the same as the 1907 table.

Monthly discharge of Chattahoochee River near Norcross, Ga., for 1907 and 1908.

[Drainage area, 1,170 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	11,000	2,100	2,930	2.50	2.88	A.
February	6,300	1,990	2,880	2.46	2.56	A.
March	9,780	1,880	2,930	2.50	2.88	A.
April	7,000	1,880	2,460	2.10	2.34	A.
May	3,140	1,660	2,160	1.85	2.13	A.
June	4,500	1,360	1,850	1.58	1.76	A.
July	3,140	990	1,510	1.29	1.49	A.
August	1,990	830	1,220	1.04	1.20	A.
September	5,600	750	1,410	1.21	1.35	A.
October	1,560	766	974	.832	.96	A.
November	10,800	870	2,290	1.96	2.19	A.
December	16,500	1,360	3,230	2.76	3.18	A.
The year	16,500	750	2,150	1.84	24.92	
1908.						
January	10,400	1,980	3,250	2.78	3.20	A.
February	14,600	2,240	4,800	4.10	4.42	A.
March	16,100	2,180	3,800	3.25	3.75	A.
April	18,900	2,290	4,430	3.79	4.23	A.
May	6,700	2,180	3,000	2.56	2.95	A.
June	3,080	1,440	1,970	1.68	1.87	B.
July	3,800	1,120	1,740	1.49	1.72	B.
August	4,130	1,030	1,800	1.54	1.78	B.
September	5,040	850	1,240	1.06	1.18	B.
October	3,440	765	1,360	1.16	1.34	B.
November	2,460	985	1,280	1.09	1.22	B.
December	14,600	1,210	2,840	2.43	2.80	A.
The year	18,900	765	2,630	2.24	30.40	

CHATTAHOOCHEE RIVER AT WEST POINT, GA.

The station is located at Montgomery Street Bridge in West Point. It was established July 30, 1896.

The datum of the gage has remained the same since the establishment of the station. The right bank is high and overflows only at high water, when most of the town is flooded. The left bank is somewhat lower and overflows for about 800 feet at a gage height of 20 feet. Conditions at this point are practically permanent and a good rating has been developed.[a]

Discharge measurements of Chattahoochee River at West Point, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 22	M. R. Hall	384	2,990	3.56	4,530
March 23	do	384	3.060	3 58	4,560
July 26	Warren E. Hall	378	2,360	2.01	1,840
1908.					
March 30	Warren E. Hall	384	3,700	4.73	6,850
December 5	M. R. Hall	362	3,070	2.79	2,940

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Chattahoochee River at West Point, Ga., for 1907 and 1908.

[Observer, A. V. Dunn.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	9.1	6.1	8.2	3.5	4.4	3.65	3.0	2.5	1.7	3.1	1.9	4.2
2	9.1	8.4	10.9	3.5	4.0	3.65	3.2	2.9	1.7	2.8	1.85	3.7
3	8.1	6.2	12.5	3.5	3.85	4.2	3.5	2.55	1.8	2.55	2.1	3.3
4	5.5	6.5	10.0	3.5	4.0	4.2	3.35	2.5	1.7	2.2	2.2	3.2
5	4.9	12.0	7.2	3.4	4.1	3.6	3.2	2.3	2.6	2.1	2.2	3.1
6	4.5	10.8	5.5	4.0	3.95	3.35	2.8	2.1	3.0	2.1	2.4	2.95
7	4.4	7.2	4.9	3.7	5.0	3.2	3.4	2.3	2.65	2.15	2.15	2.9
8	4.2	5.6	4.6	4.2	4.8	3.1	3.0	2.3	2.25	2.25	2.05	2.9
9	4.1	4.9	4.4	4.0	5.1	2.95	2.6	2.3	2.3	2.8	2.0	3.2
10	4.0	4.6	4.2	3.6	4.8	3.0	2.45	2.25	2.8	2.4	2.35	4.8
11	3.95	4.3	4.2	3.4	4.5	2.8	2.35	2.0	3.2	2.2	3.2	5.1
12	3.9	4.2	4.1	3.3	4.3	3.0	2.4	2.5	3.2	2.1	3.05	5.2
13	3.8	4.0	4.0	3.3	3.9	2.8	2.3	2.7	2.65	2.0	3.3	5.0
14	3.8	3.9	4.0	3.3	3.8	3.3	3.9	2.45	2.4	1.9	2.85	6.0
15	3.7	3.8	4.5	3.3	7.3	3.5	5.2	2.3	2.1	1.85	2.6	6.0
16	3.6	3.75	4.6	3.25	7.6	3.1	3.1	3.2	2.0	1.8	2.4	5.3
17	3.55	3.7	4.1	5.8	5.6	3.1	2.85	3.9	2.0	1.7	2.25	4.8
18	3.55	3.65	3.95	5.8	4.7	2.8	2.6	3.35	1.8	1.8	2.4	4.2
19	3.5	3.6	3.8	5.2	4.1	2.8	2.7	2.9	1.7	1.8	2.8	4.0
20	3.65	3.65	3.8	4.8	3.7	2.8	2.7	2.5	1.7	1.75	3.0	3.7
21	3.75	3.65	3.7	4.1	3.5	2.9	2.9	2.35	1.75	1.8	4.2	3.55
22	3.65	3.6	3.7	5.3	3.4	2.75	2.8	2.7	2.0	1.8	6.1	3.55
23	3.6	3.55	3.6	8.3	3.35	2.7	2.45	2.5	3.7	1.8	7.6	8.9
24	3.45	3.5	3.55	8.0	3.3	2.7	2.3	2.4	3.5	1.8	8.4	10.0
25	3.4	3.95	3.55	7.1	3.35	2.65	2.0	2.55	4.0	1.8	7.8	7.6
26	3.55	4.2	3.5	5.4	3.5	2.7	2.3	2.7	4.3	1.8	7.8	5.6
27	3.55	5.8	3.45	4.7	4.0	2.7	2.65	2.4	2.8	1.7	5.0	4.6
28	3.45	7.0	3.4	4.8	4.0	3.45	2.95	2.1	2.5	1.8	4.0	4.2
29	3.4	.....	3.35	6.8	3.9	3.1	3.3	1.95	2.6	1.75	4.3	4.8
30	3.4	.....	3.35	5.5	3.5	3.1	3.3	1.8	2.8	1.8	4.4	5.8
31	3.9	.....	3.3	.....	3.5	.....	2.95	1.8	.....	1.8	.....	7.0
1908.												
1	8.6	11.8	4.6	4.8	5.2	3.6	2.6	2.45	2.3	1.7	3.3	2.4
2	9.2	11.6	4.4	4.0	5.0	3.55	2.5	2.35	2.35	1.75	2.9	2.9
3	5.4	8.0	4.4	4.2	4.8	3.6	2.5	2.2	2.2	1.7	2.8	3.0
4	4.7	6.2	4.6	4.2	4.5	3.7	2.6	2.2	2.1	1.7	4.2	2.6
5	5.6	5.0	4.4	4.1	4.5	4.2	2.7	2.3	2.15	1.7	4.3	2.6
6	5.8	5.0	4.3	4.2	5.0	4.3	4.4	2.3	5.0	1.7	3.8	2.7
7	6.5	4.8	4.2	4.3	6.0	3.65	4.8	2.6	5.6	1.7	3.25	3.25
8	6.3	4.5	4.1	4.3	6.6	3.4	4.4	3.2	4.8	1.7	2.9	3.85
9	5.5	4.3	4.1	4.3	6.4	3.3	3.75	3.2	3.35	2.05	2.8	7.5
10	4.8	5.4	4.0	4.1	5.1	3.25	4.1	3.25	2.8	3.0	2.5	7.4
11	4.6	7.6	3.9	4.0	4.6	3.85	4.3	3.2	2.5	3.2	2.45	4.4
12	5.6	9.0	3.95	4.0	4.4	3.4	3.7	2.7	2.3	3.75	2.35	3.7
13	7.3	9.2	4.0	3.7	4.2	3.2	3.25	2.35	2.2	3.45	2.3	3.3
14	7.9	7.6	4.0	3.3	4.0	3.35	2.95	2.1	2.15	3.3	2.3	3.3
15	5.8	11.6	4.0	3.9	4.0	3.6	3.0	2.1	2.05	1.95	2.45	3.2
16	5.0	12.6	3.95	6.2	3.85	4.1	2.8	2.0	2.0	1.9	2.5	3.3
17	4.5	11.4	3.85	6.4	3.95	3.75	2.6	2.1	2.0	2.05	2.45	3.2
18	4.2	9.9	3.85	6.2	4.7	3.3	2.5	2.3	1.95	1.95	2.65	2.9
19	4.2	7.0	3.75	5.6	5.2	3.3	2.4	2.6	1.95	2.0	2.55	2.8
20	4.0	6.6	3.7	5.4	4.6	3.1	2.8	3.0	1.9	1.95	2.6	2.75
21	3.95	6.0	3.6	5.4	4.5	3.05	3.0	3.7	1.95	1.9	2.5	2.7
22	3.9	5.6	4.6	4.2	4.2	3.0	2.5	3.5	2.1	1.85	2.1	9.2
23	3.85	5.2	7.0	5.6	3.9	3.2	2.4	3.05	2.05	1.9	2.15	11.4
24	3.75	5.0	11.1	5.0	3.8	3.8	2.7	4.5	2.0	1.9	2.3	8.8
25	3.75	4.8	12.3	10.9	3.8	3.75	2.65	8.4	1.95	1.9	2.3	6.7
26	3.7	5.2	11.8	15.9	4.2	3.2	2.2	8.8	1.9	2.4	2.35	5.9
27	3.8	5.4	9.2	14.6	4.7	3.0	2.9	6.6	1.85	2.7	2.2	4.1
28	3.7	5.0	6.1	12.1	4.2	2.9	2.45	4.0	1.8	2.5	2.25	3.85
29	3.65	4.9	5.6	7.4	3.95	2.8	2.45	3.1	1.9	2.8	2.15	3.5
30	3.75	.....	4.8	5.8	4.2	2.65	2.65	2.8	1.9	3.05	2.15	3.45
31	4.1	.....	4.8	.....	4.2	.....	2.65	2.5	.....	3.25	.....	3.55

Rating table for Chattahoochee River at West Point, Ga., for 1906, 1907, and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.70	1,490	3.20	3,700	4.70	6,830	7.40	13,340
1.80	1,600	3.30	3,890	4.80	7,060	7.60	13,860
1.90	1,720	3.40	4,080	4.90	7,290	7.80	14,380
2.00	1,840	3.50	4,280	5.00	7,520	8.00	14,900
2.10	1,970	3.60	4,480	5.20	7,980	9.00	17,740
2.20	2,100	3.70	4,680	5.40	8,440	10.00	20,700
2.30	2,240	3.80	4,880	5.60	8,920	11.00	23,860
2.40	2,380	3.90	5,090	5.80	9,400	12.00	27,100
2.50	2,530	4.00	5,300	6.00	9,880	13.00	30,500
2.60	2,680	4.10	5,510	6.20	10,360	14.00	33,900
2.70	2,840	4.20	5,730	6.40	10,840	15.00	37,350
2.80	3,000	4.30	5,950	6.60	11,320	16.00	40,800
2.90	3,170	4.40	6,170	6.80	11,820		
3.00	3,340	4.50	6,390	7.00	12,320		
3.10	3,520	4.60	6,610	7.20	12,820		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 28 discharge measurements made during 1904 to 1908 and is well defined.

Monthly discharge of Chattahoochee River at West Point, Ga., for 1907 and 1908.

[Drainage area, 3,300 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	18,000	4,080	6,170	1.87	2.16	A.
February	27,100	4,280	8,350	2.53	2.64	A.
March	28,800	3,890	7,680	2.33	2.69	A.
April	15,700	3,800	6,790	2.06	2.30	A.
May	13,900	3,890	5,990	1.82	2.10	A.
June	5,730	2,760	3,600	1.09	1.22	A.
July	7,980	1,840	3,280	.994	1.15	A.
August	5,090	1,600	2,550	.773	.89	A.
September	5,950	1,490	2,660	.806	.90	A.
October	3,520	1,490	1,910	.579	.67	A.
November	16,000	1,660	4,980	1.51	1.68	A.
December	20,700	3,170	7,310	2.22	2.56	A.
The year	28,800	1,490	5,110	1.55	20.96	
1908.						
January	18,300	4,580	7,840	2.38	2.74	A.
February	29,100	5,950	13,100	3.97	4.28	A.
March	28,100	4,480	8,520	2.58	2.97	A.
April	40,500	3,890	10,400	3.15	3.51	A.
May	11,300	4,880	6,620	2.01	2.32	A.
June	5,950	2,760	4,170	1.26	1.41	A.
July	7,060	2,100	3,460	1.05	1.21	A.
August	17,200	1,840	4,190	1.27	1.46	A.
September	8,920	1,600	2,620	.794	.89	A.
October	4,780	1,490	2,290	.694	.80	A.
November	5,950	1,970	2,850	.864	.96	A.
December	25,200	2,380	6,450	1.95	2.25	A.
The year	40,500	1,490	6,040	1.83	24.80	

CHATTAHOOCHEE RIVER AT ALAGA, ALA.

This station is located at the Atlantic Coast Line Railway bridge one-fourth mile east of Alaga, 4 miles east of Gordon, and one-half mile west of Saffold, Ga. It is about 35 miles above the junction of Chattahoochee and Flint rivers. It was originally established in

1904 by the United States Weather Bureau. No rating has yet been developed for this station.

The following discharge measurement was made:

June 15, 1908: Width, 260 feet; area, 3,980 square feet; gage height, 6.26 feet: discharge, 8,180 second-feet.

Daily gage height, in feet, of Chattahoochee River at Alaga, Ala., for 1908.

[Observer, James L. Willis.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	27.8	14.3	11.5	13.0	36.7	8.6	4.8	4.2	5.2	2.7	4.7	3.0
2	26.3	30.3	11.0	12.0	29.0	8.5	5.7	4.6	4.7	2.5	4.4	3.1
3	21.6	32.0	10.5	11.7	17.4	7.6	4.8	4.4	4.2	2.5	4.7	3.5
4	19.2	32.0	10.2	10.6	13.5	7.1	5.0	4.1	4.0	2.5	4.9	3.8
5	14.7	23.3	9.9	10.1	12.2	6.8	5.6	3.9	3.9	2.2	4.9	4.4
6	14.0	16.8	9.5	9.9	12.4	6.8	6.1	3.7	3.7	2.1	5.9	4.1
7	17.8	13.8	9.8	10.4	13.2	7.6	5.8	4.2	3.6	2.2	7.0	3.7
8	25.6	12.9	9.7	10.4	13.5	7.9	7.5	4.9	4.5	2.2	6.2	3.6
9	25.9	12.2	9.4	10.0	13.5	7.0	10.0	5.2	8.6	2.4	5.2	3.8
10	24.8	11.5	9.2	9.6	13.4	6.4	9.9	6.3	8.1	2.6	4.4	4.7
11	17.0	13.0	9.0	9.5	12.7	6.0	8.2	5.8	6.7	3.2	4.1	8.0
12	16.5	17.9	8.7	9.1	11.5	6.1	8.0	5.6	5.0	3.3	3.8	11.1
13	17.5	19.3	8.6	8.9	10.3	6.7	8.1	5.2	4.3	4.2	3.6	8.1
14	16.7	19.1	8.5	8.6	9.7	6.9	7.0	4.7	3.8	4.5	3.7	8.6
15	16.3	18.9	8.5	8.4	9.2	6.3	6.8	4.1	3.4	5.0	3.6	8.0
16	16.3	21.6	8.4	8.1	8.9	6.1	5.8	3.6	3.2	4.4	3.5	5.5
17	14.0	25.5	8.4	10.2	8.5	6.3	5.3	3.2	3.0	3.1	3.5	5.0
18	12.4	26.3	8.3	14.0	8.3	6.5	5.3	3.1	2.9	2.7	3.6	4.7
19	11.4	23.7	8.0	13.3	8.2	6.7	5.7	3.1	2.8	2.5	3.6	4.4
20	10.9	24.1	7.9	12.3	9.1	6.3	4.9	3.3	2.8	2.3	3.4	4.2
21	10.2	21.1	7.9	11.3	10.0	6.4	5.5	3.9	3.1	2.5	3.6	4.0
22	9.9	17.6	7.9	10.4	9.5	5.7	5.5	4.6	3.3	2.4	3.5	3.9
23	9.8	15.1	9.6	11.9	8.7	5.6	5.7	6.1	3.3	2.5	3.5	4.5
24	10.0	13.8	25.5	15.4	8.5	5.6	5.9	7.9	3.1	2.5	3.4	12.5
25	9.8	12.7	34.5	17.3	7.7	6.5	4.8	7.2	3.1	2.3	3.3	17.0
26	9.3	12.2	36.5	17.5	7.5	7.6	5.4	9.7	3.1	2.4	3.0	14.7
27	9.0	12.2	35.3	24.9	7.8	7.1	5.9	16.3	3.0	2.4	3.1	11.5
28	8.8	12.4	32.0	33.5	7.6	6.0	5.5	16.9	3.1	2.4	3.2	8.6
29	8.6	12.2	24.7	37.1	8.4	5.3	5.8	13.5	3.0	3.4	3.3	6.8
30	8.5	.....	17.4	38.2	8.6	5.0	5.1	9.1	3.0	4.5	3.1	6.4
31	8.3	.....	14.4	.....	7.9	.....	4.4	6.4	.....	4.6	.....	5.5

SOQUE RIVER NEAR DEMOREST, GA.

This station is located at Cannon Bridge, 2½ miles from Demorest, about 4 miles above the mouth of the river, and 1½ miles below the mouth of Hazel Creek. It was established July 16, 1904.

The datum of the vertical staff gage, which is attached to the bridge from which discharge measurements are made, has remained the same since the establishment of the station. Both banks are high, but the right bank overflows at extreme high water. Conditions of flow at this point are permanent and a good rating has been developed for low and medium low stages.[a]

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Discharge measurements of Soque River near Demorest, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 1	F. A. Murray	87	355	3.53	791
March 5	do	84	281	2.58	448
May 8	M. R. Hall and F. A. Murray	87	245	2.30	328
June 15	F. A. Murray	81	219	2.00	242
July 15	do	85	260	2.51	379
Do	B. M. Hall, jr	86	283	2.51	460
November 8	F. A. Murray	83	194	1.64	155
1908.					
May 20	M. R. Hall	82	249	2.60	452

Daily gage height, in feet, of Soque River near Demorest, Ga., for 1907 and 1908.

[Observer, Charles Cannon.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.4	3.35	2.75	2.3	2.35	2.85	2.0	2.1	1.65	1.9	1.7	2.0
2	3.25	3.8	3.8	2.25	2.35	2.7	2.25	2.0	1.6	1.9	1.8	2.0
3	3.15	2.55	3.0	2.25	2.4	2.45	3.0	2.0	1.6	1.9	1.9	2.0
4	2.9	3.45	2.9	2.2	3.8	2.3	6.2	1.95	3.05	1.95	2.0	2.0
5	2.8	2.9	2.65	2.25	2.45	2.3	2.95	1.9	2.2	2.0	1.9	2.1
6	2.7	2.55	2.5	2.35	2.4	2.2	2.6	1.95	3.45	1.9	1.9	2.05
7	2.75	2.5	2.55	2.3	2.3	2.2	2.2	1.9	2.1	1.8	1.85	2.0
8	2.65	2.45	2.4	2.25	2.35	2.25	2.1	1.8	1.8	2.15	1.8	1.9
9	2.6	2.45	2.35	2.2	2.3	2.3	2.05	1.75	1.75	2.0	1.8	2.8
10	2.55	2.4	2.4	2.25	2.35	2.25	2.3	1.75	1.75	1.9	2.95	2.05
11	2.5	2.45	2.4	2.35	2.4	2.2	2.15	1.75	1.8	1.8	2.55	2.0
12	2.55	2.4	2.35	2.3	2.35	2.2	2.1	1.8	1.75	1.8	2.75	2.0
13	2.4	2.4	2.35	2.25	2.3	2.1	3.05	1.85	1.7	1.75	2.6	2.05
14	2.3	2.35	2.35	2.2	2.3	2.1	2.4	1.85	1.7	1.7	2.35	3.25
15	2.25	2.35	2.5	2.2	2.4	2.05	2.85	2.0	1.65	1.7	2.2	2.45
16	2.25	2.35	2.4	2.2	2.3	2.05	2.6	1.9	1.65	1.7	2.2	2.3
17	2.2	2.3	2.3	2.2	2.3	2.0	2.7	1.8	1.6	1.7	2.1	2.25
18	2.2	2.25	2.25	2.35	2.25	2.0	2.9	2.0	1.6	1.7	2.15	2.3
19	2.2	2.25	2.25	3.05	2.15	2.15	2.4	1.85	1.6	1.7	2.2	2.1
20	2.65	2.25	2.2	2.8	2.15	2.05	2.25	1.8	1.6	1.7	2.35	2.1
21	2.35	2.25	2.2	2.7	2.1	2.0	2.05	1.8	1.55	1.65	3.25	2.1
22	2.3	2.2	2.2	3.8	2.1	2.0	2.0	1.8	1.55	1.65	2.65	2.0
23	2.25	2.2	2.2	4.0	2.15	2.0	2.0	1.85	4.1	1.6	3.4	5.8
24	2.2	2.2	2.2	3.05	2.2	2.0	2.0	1.95	2.8	1.6	6.2	3.1
25	2.2	2.35	2.2	2.7	2.25	2.0	1.9	1.8	2.0	1.6	3.45	2.8
26	2.25	2.85	2.2	2.45	2.6	2.0	1.85	1.8	1.9	1.65	2.35	2.2
27	2.35	2.65	2.2	2.3	2.55	2.0	1.85	1.75	1.95	1.75	2.2	2.15
28	2.25	2.6	2.2	2.45	2.4	2.1	2.0	1.75	2.0	1.7	2.15	2.25
29	2.2	.....	2.2	2.4	2.35	2.4	3.95	1.7	1.95	1.7	2.2	2.75
30	2.3	.....	2.2	2.35	2.3	2.1	2.8	1.7	1.9	1.7	2.1	6.3
31	2.6	.....	2.25	.....	2.5	.....	2.4	1.7	.....	1.65	.....	3.55
1908.												
1	2.85	2.5	2.6	1.65	2.7	2.3	2.35	1.95	1.9	1.7	2.2	2.2
2	2.5	2.65	2.45	1.65	2.7	2.25	2.35	1.95	1.9	1.7	2.2	2.35
3	2.5	2.55	2.4	1.6	2.65	2.25	2.7	2.2	1.95	1.7	2.1	2.15
4	2.45	2.4	2.4	1.6	2.65	2.3	2.8	2.0	2.0	1.7	3.0	2.05
5	3.7	2.35	2.4	1.7	2.6	2.45	3.4	2.0	2.0	1.7	2.75	2.0
6	2.5	2.35	2.4	2.85	2.85	2.6	2.9	2.6	5.0	1.7	2.4	2.0
7	2.6	2.3	2.35	2.7	4.7	2.5	2.45	2.8	3.2	1.7	2.25	8.1
8	2.5	2.3	2.35	1.95	2.9	2.45	2.35	2.25	2.4	1.75	2.05	5.05
9	2.45	2.25	2.4	1.75	2.75	2.45	2.65	2.0	2.35	1.8	1.95	3.15
10	2.45	2.8	2.5	1.65	2.65	2.6	2.4	1.9	2.2	2.0	1.9	2.6
11	6.1	5.0	2.95	1.6	2.65	2.5	2.4	1.85	2.15	1.9	1.9	2.5
12	4.4	4.1	2.8	1.8	2.6	2.65	2.4	1.85	2.15	1.85	1.9	2.6
13	3.2	3.8	2.7	2.0	2.6	2.8	2.45	1.8	2.0	1.85	2.0	2.55
14	2.85	3.4	2.6	4.1	2.6	2.5	3.0	1.8	1.9	1.8	2.1	2.5
15	2.8	9.2	2.6	3.0	2.6	3.9	2.55	1.8	1.85	1.75	1.95	2.5

Daily gage height, in feet, of Soque River near Demorest, Ga., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	2.65	3.8	2.55	2.8	2.7	2.8	2.3	1.8	1.85	1.75	1.9	2.45
17	2.5	3.4	2.55	3.1	2.7	2.4	2.15	2.0	1.8	1.7	1.9	2.45
18	2.5	3.0	2.65	2.85	2.7	2.35	2.1	.....	1.8	1.75	1.85	2.2
19	2.5	3.2	2.5	2.9	3.0	2.35	2.1	4.4	1.8	1.7	1.85	2.05
20	2.6	2.95	3.4	2.8	2.85	2.35	2.05	.....	1.8	1.7	1.85	2.05
21	2.55	2.85	3.7	2.7	2.75	3.0	2.0	.....	1.8	1.7	1.8	2.8
22	2.5	2.8	2.75	2.65	2.7	2.9	2.0	3.2	1.75	1.75	1.8	6.1
23	2.4	2.7	5.8	2.5	2.7	2.4	2.0	2.25	1.75	3.6	1.8	3.0
24	2.35	2.65	9.0	2.5	2.65	2.35	2.1	3.15	1.7	3.65	1.85	2.55
25	2.25	2.7	4.0	11.75	2.6	2.3	2.0	2.45	1.7	2.25	1.85	2.45
26	2.3	2.7	3.0	4.1	2.6	2.3	2.05	2.2	1.75	2.0	1.85	2.4
27	2.4	2.65	2.85	3.7	2.55	2.3	2.1	2.15	1.8	2.0	1.8	2.35
28	2.25	2.65	2.7	3.4	2.5	2.3	2.1	2.0	1.75	2.15	1.8	2.35
29	2.2	2.6	2.7	3.35	2.5	2.3	2.3	1.9	1.7	3.5	1.85	2.35
30	2.2	.....	2.7	2.9	2.65	2.3	2.05	1.9	1.7	2.35	1.85	2.35
31	2.3	.....	1.65	.....	2.4	.....	1.95	1.9	.....	2.2	.....	2.85

Rating table for Soque River near Demorest, Ga., for 1906, 1907, and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	133	2.90	531	4.30	1,150	6.40	2,520
1.60	151	3.00	568	4.40	1,200	6.60	2,680
1.70	171	3.10	606	4.50	1,255	6.80	2,840
1.80	193	3.20	645	4.60	1,310	7.00	3,000
1.90	217	3.30	685	4.70	1,365	7.20	3,170
2.00	243	3.40	725	4.80	1,420	7.40	3,340
2.10	271	3.50	770	4.90	1,480	7.60	3,520
2.20	300	3.60	815	5.00	1,540	7.80	3,700
2.30	330	3.70	860	5.20	1,665	8.00	3,880
2.40	361	3.80	905	5.40	1,795	9.00	4,780
2.50	393	3.90	950	5.60	1,930	10.00	5,680
2.60	426	4.00	1,000	5.80	2,070	11.00	6,580
2.70	460	4.10	1,050	6.00	2,220	12.00	7,480
2.80	495	4.20	1,100	6.20	2,370		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 29 discharge measurements made during 1904 to 1908, and is well defined below gage height 6 feet. Above gage height 7.4 feet the rating curve is a tangent, the difference being 90 per tenth.

Monthly discharge of Soque River near Demorest, Ga., for 1907 and 1908.

[Drainage area, 158 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	725	300	398	2.52	2.90
February	905	300	413	2.61	2.72
March	905	300	372	2.35	2.71
April	1,000	300	400	2.53	2.82
May	905	271	356	2.25	2.59
June	513	243	295	1.87	2.09
July	2,370	205	433	2.74	3.16
August	271	171	206	1.30	1.50
September	1,050	142	259	1.64	1.83
October	286	151	188	1.19	1.37
November	2,370	171	411	2.60	2.90
December	2,440	217	462	2.92	3.37
The year	2,440	142	349	2.21	29.96

Monthly discharge of Soque River near Demorest, Ga., for 1907 and 1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1908.					
January	2,300	300	499	3.16	3.64
February	4,960	315	706	4.47	4.82
March	4,780	161	653	4.13	4.76
April	7,260	151	667	4.22	4.71
May	1,360	361	479	3.03	3.49
June	950	315	401	2.54	2.83
July	725	230	348	2.20	2.54
August[a]	1,200	193	373	2.36	2.72
September	1,540	171	278	1.76	1.96
October	838	171	265	1.68	1.94
November	568	193	250	1.58	1.76
December	3,970	243	589	3.73	4.30
The year	7,260	151	459	2.90	39.47

[a] Discharge is interpolated for days when the gage height was not recorded.

NOTE.—Owing to rather poor gage heights, caused by fluctuations from dam above, the above values are classed as B.

FLINT RIVER NEAR WOODBURY, GA.

The station is located at the Macon and Birmingham Railroad bridge, 3 miles east of Woodbury, Ga. It is below the mouth of Elkins Creek and above Cane Creek. It was established March 29, 1900.

The datum of the vertical staff gage, which is located 300 feet above the bridge from which discharge measurements are made, has remained the same since the establishment of the station. It is 660 feet above sea level. Above gage height 10 feet the banks are subject to overflow for a width of about 350 feet, but all water passes beneath the bridge and its approaches. The bed is rough and irregular, and conditions of flow are practically permanent. A fairly good rating has been developed.[a]

Discharge measurements of Flint River near Woodbury, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 28	M. R. Hall	268	858	0.77	731
November 9	G. F. Harley	279	748	.12	278
November 28	Warren E. Hall	253	983	1.45	1,310

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Flint River near Woodbury, Ga., for 1907 and 1908.

[Observer, Rosa B. Craven.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.5	1.7	2.5	0.75	2.3	1.25	1.2	0.85	0.1	0.4	0.05	1.65
2	2.4	2.8	2.9	.80	1.65	1.15	1.45	.7	.0	.4	.1	1.35
3	2.1	4.5	3.5	.75	1.45	.95	3.2	3.9	.0	.3	.15	1.15
4	1.8	4.6	4.0	.7	2.0	.8	2.3	2.3	.15	.2	.1	1.0
5	1.6	4.4	3.4	.7	1.65	.7	1.0	1.2	.55	.2	.1	.9
6	1.4	4.7	2.55	1.15	1.35	.85	.8	.85	.25	.1	.1	.8
7	1.2	5.0	1.9	1.05	1.35	.55	.55	1.25	.2	.1	.1	.8
8	1.1	3.7	1.55	1.15	1.55	.5	.45	.9	.15	.15	.1	.7
9	1.0	2.7	1.35	1.15	1.65	.45	.5	.65	.45	.2	.1	1.05
10	1.0	2.0	1.3	1.0	1.5	.4	1.05	.5	.6	.25	.3	1.9
11	1.0	1.7	1.2	.85	1.35	.4	.65	.4	.6	.25	.65	1.85
12	1.0	1.5	1.15	.8	1.25	.35	.65	.6	.45	.2	.8	1.65
13	1.0	1.3	1.1	.7	1.1	.35	.5	2.65	.35	.1	.7	1.7
14	.9	1.2	1.1	.6	1.0	.7	.45	2.85	.3	.05	.6	3.0
15	.9	1.3	1.55	.6	2.8	.7	1.0	1.5	.2	.0	.4	3.1
16	.9	1.1	1.6	.6	2.65	.55	2.05	3.3	.2	.0	.3	2.75
17	.9	1.1	1.65	2.9	2.5	.45	1.15	2.8	.3	.0	.3	2.2
18	.8	1.0	1.35	3.2	1.9	.4	1.1	2.7	.1	.05	.4	1.75
19	.8	1.0	1.2	2.95	1.35	.35	.8	1.85	05	.0	.75	1.55
20	.9	1.1	1.1	2.5	1.05	.3	.55	1.4	.0	.0	.8	1.35
21	1.1	1.1	1.0	1.8	.9	.25	.6	1.05	.0	.0	1.45	1.2
22	1.0	1.0	1.0	2.25	.8	.2	.55	1.0	.0	.0	2.3	1.2
23	.9	1.0	.95	4.0	.75	.2	.25	.8	1.4	.0	3.2	5.5
24	.8	.9	.85	3.8	.7	.6	.2	.55	1.55	.0	3.6	5.7
25	.8	1.2	.80	3.2	.75	1.0	.35	.4	.95	.0	3.1	5.1
26	.9	1.4	.80	2.45	.8	.9	.5	.35	.8	.0	2.6	4.0
27	1.0	1.8	.75	2.0	1.25	.6	1.7	.25	.45	.0	1.9	2.8
28	.9	2.0	.7	1.65	1.0	2.7	2.0	.2	.35	.0	1.45	2.35
29	.8	.....	.7	3.6	.8	4.2	1.7	.2	.6	.1	1.95	2.45
30	.8	.....	.7	3.8	.7	2.3	2.4	.1	.5	.1	2.05	4.0
31	1.2	.....	.7	.....	.8	.....	2.0	.1	.....	.05	.....	4.8
1908												
1	3.8	6.1	1.7	1.65	2.6	1.05	.2	.5	.55	.35	1.05	.9
2	3.2	7.1	1.6	1.5	2.1	.8	.25	.35	.45	.3	.9	1.2
3	2.4	6.3	1.55	1.4	1.7	.8	1.2	.3	.4	.25	.95	1.15
4	2.05	4.6	1.7	1.35	1.5	.7	1.3	.2	.4	.2	1.15	1.1
5	2.4	3.3	1.7	1.25	1.4	1.5	1.0	1.1	1.4	.2	1.55	.95
6	2.6	2.6	1.65	1.5	1.45	1.25	2.3	1.05	2.9	.2	1.6	.95
7	3.7	2.25	1.55	1.45	1.5	.95	2.2	1.1	2.6	.2	1.45	1.05
8	4.2	2.05	1.5	1.3	1.65	.7	2.7	.65	2.2	.4	1.15	1.35
9	3.5	1.85	1.4	1.25	1.6	.6	2.0	.8	1.55	1.15	.95	1.4
10	2.9	2.7	1.35	1.15	1.35	.6	2.15	.45	1.15	1.25	.9	1.35
11	3.1	4.6	1.3	1.1	1.2	.7	1.65	.4	.75	1.05	.8	1.15
12	3.6	4.8	1.3	1.0	1.1	.65	1.7	.35	.6	.95	.8	1.2
13	3.2	4.4	1.3	.9	1.0	.7	2.0	.25	.5	.85	.8	1.2
14	2.8	3.6	1.3	.9	.9	.65	1.15	.15	.5	.65	.95	1.1
15	2.25	5.8	1.3	1.5	.9	.65	.7	.1	.4	.6	1.15	1.05
16	2.0	6.1	1.2	2.3	.9	.55	.65	.1	.35	.5	1.1	1.0
17	1.85	5.6	1.2	2.3	.9	.5	.55	.05	.35	.5	1.0	.95
18	1.7	4.6	1.2	2.0	1.25	.55	.45	.15	.4	.5	.95	.9
19	1.55	4.2	1.1	1.65	1.65	.85	.4	.45	.3	.4	.9	.9
20	1.5	3.7	1.1	1.55	1.65	1.0	.5	.3	.4	.45	.85	.9
21	1.4	3.2	1.1	1.45	1.45	1.15	.55	.3	.45	.5	.8	1.0
22	1.45	2.7	1.15	1.45	1.15	1.4	.45	.55	.5	.5	.8	3.6
23	1.5	2.3	3.0	2.35	.95	1.45	.35	1.95	.6	.5	.8	5.8
24	1.35	2.1	6.8	2.35	.85	1.05	.35	1.2	.6	.5	.8	5.8
25	1.2	1.9	6.4	3.85	1.05	1.65	.35	3.0	.6	.5	.8	4.8
26	1.2	2.05	5.2	4.8	1.25	.55	.6	5.2	.5	.5	.8	3.3
27	1.35	2.05	3.1	9.2	1.55	.45	.5	5.4	.4	.5	.8	2.3
28	1.8	1.95	3.0	8.0	1.4	.35	.4	3.6	.45	.85	.75	1.75
29	1.6	1.85	2.4	5.5	1.05	.3	.3	2.1	.5	1.55	.7	1.4
30	1.35	.....	1.95	3.6	1.45	.3	.3	1.25	.4	1.45	.7	1.5
31	1.45	.....	1.75	.....	1.65	.....	.4	.75	.....	1.25	.....	1.9

Rating table for Flint River near Woodbury, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.00	225	1.30	1,220	2.60	2,720	4.80	6,160
.10	270	1.40	1,320	2.70	2,860	5.00	6,520
.20	320	1.50	1,420	2.80	3,000	5.20	6,880
.30	380	1.60	1,520	2.90	3,140	5.40	7,260
.40	450	1.70	1,630	3.00	3,280	5.60	7,640
.50	520	1.80	1,740	3.20	3,560	5.80	8,040
.60	600	1.90	1,860	3.40	3,850	6.00	8,450
.70	680	2.00	1,980	3.60	4,160	7.00	10,750
.80	760	2.10	2,100	3.80	4,480	8.00	13,250
.90	850	2.20	2,220	4.00	4,800	9.00	15,750
1.00	940	2.30	2,340	4.20	5,140	10.00	18,250
1.10	1,030	2.40	2,460	4.40	5,480		
1.20	1,120	2.50	2,590	4.60	5,820		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on nine discharge measurements made during 1906 and 1907 and three earlier measurements above gage height 4 feet. It is well defined.

Monthly discharge of Flint River near Woodbury, Ga., for 1907 and 1908.

[Drainage area, 990 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,590	760	1,100	1.11	1.28	A.
February	6,520	850	2,310	2.33	2.43	A.
March	4,800	680	1,540	1.56	1.80	A.
April	4,800	600	1,890	1.91	2.13	A.
May	3,000	680	1,340	1.35	1.56	A.
June	5,140	320	888	.897	1.00	A.
July	3,560	320	1,090	1.10	1.27	A.
August	4,640	270	1,300	1.31	1.51	A.
September	1,470	225	473	.478	.53	A.
October	450	225	277	.280	.32	B.
November	4,160	248	1,110	1.12	1.25	A.
December	7,840	680	2,580	2.61	3.01	A.
The year	7,840	225	1,320	1.34	18.09	
1908.						
January	5,140	1,120	2,380	2.40	2.77	A.
February	11,040	1,800	4,540	4.59	4.95	A.
March	10,300	1,030	2,290	2.31	2.66	A.
April	16,200	850	2,900	2.93	3.27	A.
May	2,720	805	1,300	1.31	1.51	A.
June	1,580	380	792	.800	.89	A.
July	2,860	320	974	.984	1.13	A.
August	7,260	248	1,280	1.29	1.49	A.
September	3,140	380	802	.810	.90	A.
October	1,470	320	645	.652	.75	A.
November	1,520	680	906	.915	1.02	A.
December	8,040	850	1,940	1.96	2.26	A.
The year	16,200	248	1,730	1.75	23.60	

FLINT RIVER NEAR MUSELLA, GA.

The station is located 10 miles southwest of Musella, Ga., and 1 mile below the mouth of Ulcohachee Creek. It was established September 14, 1907, and was discontinued on December 31 of the same year.

Discharge measurements of Flint River near Musella, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
November 6 [a]	G. F. Harley	82	181	2.70	458
Do [a]	do	80	178	2.68	458

[a] Measured from boat ⅜ mile below gage.

Daily gage height, in feet, of Flint River near Musella, Ga., for 1907.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1			2.6	4.2	17	2.9	2.6	2.9	4.9
2		2.8	2.6	4.1	18	2.7	2.7	3	4.2
3		3	2.6	3.9	19	2.6	2.7	3.2	4.4
4		3	2.7	3.7	20	2.7	2.7	3.4	4.2
5		2.9	2.7	3.6					
					21	2.6	2.6	4.9	4.0
6		2.8	2.7	3.2	22	2.6	2.6		3.9
7		2.9		3.4	23	2.9	2.6	9.0	
8		2.7		3.3	24	2.7	2.6		
9		2.8		3.2	25	2.8	2.5		8.9
10		2.8		3.2					
					26	2.6	2.6	4.9	7.1
11		2.8	3	4.6	27	2.9	2.6	4.2	5.2
12		2.8	3.3	4.4	28	3.8	2.6	5.1	4.8
13		2.8	3.2	4.8	29	2.9	2.6	5.6	5.2
14	3	2.7	3.2		30	2.8	2.6	4.7	
15	2.9	2.6	3.1	7.7	31		2.5		
16	2.9	2.6	3	5.3					

NOTE.—Water over the top of the gage December 14, 23, 24, and 30.

FLINT RIVER NEAR MONTEZUMA, GA.

The station is located at the iron highway bridge about 1 mile west of Montezuma. It was established by the United States Weather Bureau, by whom gage heights are supplied, in 1904.

The datum of the chain gage has remained the same since the establishment of the station. The right bank will overflow for a great distance at a stage of about 12 feet. The overflowed portion is largely covered with a dense growth of brush. The left bank is not liable to overflow. Conditions of flow are permanent and a very good rating has been developed. Gage heights obtained at this point, however, are considered too poor to warrant publication of monthly discharge.[a]

Discharge measurements of Flint River near Montezuma, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 16	F. A. Murray	295	1,350	3.62	1,800
Do	do	295	1,350	3.64	1,830
August 22	Warren E. Hall	196	1,600	4.80	2,370
1908.					
January 3	Warren E. Hall	1,750	5,160	14.05	10,300

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

FLINT RIVER AT ALBANY, GA.

The station is located at the Atlantic Coast Line bridge in Albany, about 700 feet above the highway bridge where the gage is located. It was originally established by the United States Weather Bureau in 1893. It was maintained with some interruptions until the United States Geological Survey began to make discharge measurements in 1901, and has been maintained continuously since that time, all gage heights being furnished by the United States Weather Bureau, except those for a portion of 1903. On June 17, 1902, a new gage was installed by the Weather Bureau, and its datum was put 9 inches lower than that of the former gage. The 1902 gage heights as published by the Weather Bureau all refer to the new gage datum. The present standard chain gage, installed by the Geological Survey, has the same datum and reads in conformity with the Weather Bureau gage.

The river overflows both banks but only under the approaches to the bridge. The bed is rock and very rough and the current is irregular. Conditions of flow are permanent and a very good rating has been developed.[a]

Discharge measurements of Flint River at Albany, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 18	M. R. Hall	240	1,550	2.59	[b] 4,240
Do	do	110	2,320	2.52	[c] 4,050
1908.					
January 1	Warren E. Hall	321	4,670	13.44	[b] 17,700
June 9	do	261	1,940	4.36	[b] 6,110

Daily gage height, in feet, of Flint River at Albany, Ga., for 1907 and 1908.

[Observer, D. W. Brosnan.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4.1	3.7	3.8	1.6	9.0	2.0	1.5	6.1	1.1	11.0	0.5	7.6
2	4.8	3.7	4.5	1.8	8.1	1.8	1.7	5.6	.8	9.5	.5	7.6
3	5.8	4.3	4.7	1.8	7.8	1.8	2.6	5.0	.6	8.0	.8	7.5
4	6.4	5.4	5.3	1.9	7.9	2.0	4.6	4.4	.5	5.4	.8	7.9
5	7.2	6.5	5.7	1.9	8.4	2.2	6.8	5.0	.7	4.0	.8	8.4
6	7.8	7.4	6.7	2.5	8.4	2.3	7.2	5.9	.7	3.2	.7	8.0
7	6.4	8.1	7.2	3.2	7.5	2.2	7.0	6.9	1.0	2.6	.9	6.6
8	5.4	8.8	7.4	4.5	6.3	1.9	6.8	7.6	1.3	2.3	.9	5.1
9	4.2	9.2	7.3	5.4	5.9	1.6	6.4	7.3	1.2	2.2	.8	4.3
10	3.7	10.3	6.2	6.0	5.8	1.3	4.2	6.2	1.6	2.0	.8	4.1
11	3.4	11.1	5.0	5.8	6.4	1.2	2.8	5.5	2.3	1.8	.7	5.0
12	3.2	10.8	3.8	5.2	7.5	1.1	2.0	6.3	2.3	1.5	1.0	6.0
13	3.2	10.4	3.8	4.2	7.7	1.1	1.7	6.9	2.0	1.5	1.5	6.5
14	3.1	8.8	3.4	3.3	7.8	1.3	2.3	7.5	2.0	1.4	1.7	11.4
15	2.9	6.0	3.2	2.9	7.6	1.8	2.5	8.7	1.8	1.4	1.7	13.5
16	2.6	4.3	3.3	2.7	6.0	2.0	2.3	8.8	1.6	1.3	1.9	13.0
17	2.3	3.5	3.5	2.5	5.8	1.8	2.8	8.6	1.3	1.2	1.9	15.8
18	2.3	3.3	4.3	2.4	5.8	1.5	2.8	8.0	1.2	1.1	2.0	15.3
19	2.7	3.2	4.9	2.5	6.3	1.2	3.0	6.0	1.2	1.0	1.8	14.2
20	3.4	3.5	5.2	3.5	7.3	1.1	3.5	5.8	1.1	1.0	1.6	13.0

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

[b] Measurement made at Atlantic Coast Line Railway bridge.

[c] Measurement made at Georgia Northern Railway bridge.

Daily gage height, in feet, of Flint River at Albany, Ga., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	2.7	4.0	5.0	5.5	7.2	1.0	4.0	5.8	1.1	0.9	1.9	11.6
22	2.2	3.8	4.4	7.0	6.3	.8	3.5	5.6	1.0	.8	2.2	10.7
23	2.2	3.7	3.4	7.7	4.6	.7	2.7	5.4	.9	.8	2.6	11.0
24	2.9	3.5	2.8	8.6	3.4	.6	1.9	3.8	.8	.8	4.6	11.6
25	2.6	3.5	2.4	9.5	2.8	.5	1.3	3.0	.8	.7	6.4	12.7
26	2.7	3.4	2.4	10.2	2.5	.6	1.2	2.6	1.0	.6	7.3	13.5
27	2.8	3.2	2.2	10.4	2.2	.7	1.1	2.0	1.3	.6	8.3	14.4
28	2.9	3.5	2.1	10.3	2.2	.9	1.0	1.7	1.6	.6	8.7	14.7
29	3.1	.....	1.8	10.3	2.1	1.2	2.4	1.5	2.1	.5	8.5	14.9
30	3.2	.....	1.8	10.0	2.1	1.4	3.9	1.4	9.1	.5	8.0	15.0
31	3.5	.....	1.7	.....	2.0	.....	5.1	1.4	.....	.5	.....	14.8
1908.												
1	13.9	7.1	9.8	20.2	23.5	4.1	2.8	2.3	7.9	1.6	1.4	1.2
2	12.5	9.4	8.0	17.5	26.8	3.9	2.5	2.0	7.3	1.5	1.8	1.0
3	10.5	17.4	6.8	13.8	28.0	3.7	2.1	1.8	6.0	1.5	2.5	1.0
4	11.4	21.0	6.0	10.3	27.0	3.7	1.9	1.5	5.5	1.4	3.0	1.2
5	13.4	21.4	5.7	8.0	26.7	3.6	1.9	1.5	3.9	1.3	3.1	1.4
6	14.5	21.6	5.5	7.3	21.5	3.6	2.1	1.5	4.0	1.3	2.8	1.7
7	15.2	18.8	5.4	6.9	17.0	3.5	2.7	1.4	3.5	1.1	2.4	1.7
8	15.7	16.2	5.4	6.7	12.0	4.2	3.1	1.4	3.5	.9	2.1	1.8
9	16.3	15.4	5.3	6.5	9.2	4.5	3.3	2.0	3.6	.8	2.1	1.9
10	16.4	16.0	5.1	6.1	8.1	4.5	4.2	2.5	4.0	1.0	2.1	1.8
11	17.3	15.9	4.8	6.0	7.0	4.3	5.0	3.0	4.1	.8	2.0	1.6
12	16.8	13.9	4.6	5.8	7.0	3.8	5.4	3.2	3.9	.9	2.0	2.0
13	16.9	11.3	4.6	5.5	6.8	3.2	5.4	2.9	3.5	.9	1.9	2.4
14	16.9	10.8	4.5	5.0	6.2	3.0	5.3	2.4	3.2	.9	1.9	2.4
15	16.2	10.9	4.5	4.8	5.5	2.9	4.8	2.0	2.8	.8	1.8	3.3
16	14.8	13.0	4.4	5.0	5.2	2.7	4.0	1.8	2.3	.7	1.5	3.6
17	13.2	14.7	4.4	6.3	4.6	2.5	3.9	1.5	1.8	.7	1.3	3.4
18	11.0	15.3	4.2	7.7	4.1	2.2	3.9	1.3	1.5	.6	1.1	2.9
19	10.4	15.5	4.2	9.0	4.0	2.2	4.2	1.3	1.3	.6	1.3	2.5
20	9.7	16.0	4.2	9.6	3.8	2.5	4.5	1.2	1.3	.6	1.6	2.5
21	8.8	16.4	4.1	10.1	4.4	2.5	4.3	1.1	1.5	.7	1.9	2.3
22	8.0	16.7	4.4	10.3	4.5	2.3	4.0	1.0	1.7	.7	1.9	2.4
23	7.4	16.9	5.3	10.3	4.5	2.1	3.6	1.6	1.7	.6	1.7	2.8
24	7.2	16.5	11.0	9.0	4.4	2.1	3.1	2.1	1.6	.6	1.5	2.6
25	7.1	15.6	19.4	8.3	4.3	2.1	2.6	2.7	1.6	.6	1.5	2.2
26	6.8	15.0	23.1	9.3	4.9	2.0	2.4	4.3	1.6	.6	1.5	2.0
27	6.5	14.7	23.2	11.0	5.1	2.5	2.3	5.2	1.7	.6	1.6	2.2
28	6.5	14.5	22.1	15.0	4.9	3.1	2.5	6.1	1.7	.8	1.7	3.6
29	6.4	12.9	21.5	18.5	4.5	3.4	2.6	6.8	1.8	.9	1.7	5.6
30	6.4	.....	22.2	19.8	4.2	3.2	2.6	7.4	1.8	1.0	1.5	7.4
31	6.3	.....	21.8	.....	4.2	.....	2.4	7.8	.....	1.3	.....	7.4

Rating table for Flint River at Albany, Ga., for 1906, 1907, and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.50	2,330	2.30	4,000	4.20	6,015	11.00	14,420
.60	2,420	2.40	4,100	4.40	6,245	12.00	15,750
.70	2,510	2.50	4,200	4.60	6,475	13.00	17,150
.80	2,600	2.60	4,300	4.80	6,705	14.00	18,630
.90	2,690	2.70	4,400	5.00	6,940	15.00	20,140
1.00	2,780	2.80	4,500	5.20	7,180	16.00	21,700
1.10	2,870	2.90	4,600	5.40	7,420	17.00	23,300
1.20	2,960	3.00	4,700	5.60	7,670	18.00	24,900
1.30	3,050	3.10	4,805	5.80	7,920	19.00	26,600
1.40	3,140	3.20	4,910	6.00	8,170	20.00	28,300
1.50	3,235	3.30	5,015	6.20	8,420	21.00	30,000
1.60	3,330	3.40	5,120	6.40	8,670	22.00	31,800
1.70	3,425	3.50	5,230	6.60	8,920	23.00	33,600
1.80	3,520	3.60	5,340	6.80	9,170	24.00	35,400
1.90	3,615	3.70	5,450	7.00	9,420	25.00	37,200
2.00	3,710	3.80	5,560	8.00	10,670	26.00	39,000
2.10	3,805	3.90	5,670	9.00	11,920	27.00	40,800
2.20	3,900	4.00	5,785	10.00	13,170	28.00	42,600

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 25 discharge measurements made during 1903 to 1908 and is well defined below gage height 20 feet.

Monthly discharge of Flint River at Albany, Ga., for 1907 and 1908.

[Drainage area, 5,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	10,400	3,900	5,570	1.11	1.28	A.
February	14,600	4,910	7,960	1.59	1.66	A.
March	9,920	3,420	6,070	1.21	1.40	A.
April	13,700	3,330	7,330	1.47	1.64	A.
May	11,900	3,710	8,070	1.61	1.86	A.
June	4,000	2,330	3,140	.628	.70	A.
July	9,670	2,780	5,160	1.03	1.19	A.
August	11,700	3,140	7,510	1.50	1.73	A.
September	12,000	2,330	3,330	.666	.74	A.
October	14,400	2,330	4,180	.836	.96	A.
November	11,500	2,330	4,670	.934	1.04	A.
December	21,400	5,900	14,000	2.80	3.23	A.
The year	21,400	2,330	6,420	1.28	17.43	
1908.						
January	23,800	8,540	15,600	3.12	3.60	A.
February	31,100	9,540	20,700	4.14	4.46	A.
March	34,000	5,900	13,000	2.60	3.00	A.
April	28,600	6,700	13,100	2.62	2.92	A.
May	42,600	5,560	14,100	2.82	3.25	A.
June	6,360	3,710	4,870	.974	1.09	A.
July	7,420	3,620	5,170	1.03	1.19	A.
August	10,400	2,780	4,560	.912	1.05	A.
September	10,500	3,050	4,870	.974	1.09	A.
October	3,330	2,420	2,700	.540	.62	A.
November	4,800	2,870	3,600	.720	.80	A.
December	9,920	2,780	4,420	.884	1.02	A.
The year	42,600	2,420	8,890	1.78	24.09	

FLINT RIVER AT BAINBRIDGE, GA.

The station is located at the county wagon bridge one-half mile from Bainbridge, and about 25 miles above the mouth of the river or junction with Chattahoochee River. It was established in 1904 by the United States Weather Bureau. The measurement of discharge at this point was begun by the United States Geological Survey in 1908. No rating has yet been developed.

Discharge measurements of Flint River at Bainbridge, Ga., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 11	Warren E. Hall	332	3,810	8.50	8,260
August 18	do	312	2,640	5.55	5,440

Daily gage height, in feet, of Flint River at Bainbridge, Ga., in 1908.

[Observer, Leonard W. Willis.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.5	11.1	14.8	24.4	21.5	9.7	7.0	7.0	11.0	5.7	5.0	4.9
2	17.5	14.6	13.3	23.9	22.6	9.5	6.6	6.8	11.0	5.4	5.6	4.9
3	17.5	15.4	13.9	22.8	24.3	9.5	6.4	6.5	10.6	5.3	5.9	4.9
4	17.0	18.6	13.5	20.5	26.7	9.2	6.3	6.4	8.8	5.2	5.9	4.9
5	17.0	20.5	13.1	16.5	26.8	9.0	6.5	6.0	7.5	5.1	5.6	5.1
6	17.0	21.5	12.7	15.5	27.1	8.9	6.7	6.1	7.3	5.3	5.6	5.2
7	18.0	21.4	12.3	14.5	26.2	8.9	7.0	6.1	7.1	4.8	5.6	5.3
8	18.5	21.1	12.0	13.8	24.2	8.8	7.3	6.1	7.1	4.7	5.7	5.4
9	19.2	20.8	11.9	13.3	20.8	8.8	7.5	6.4	7.1	4.7	5.9	5.2
10	20.0	20.8	11.8	12.9	16.7	8.9	7.8	6.6	7.3	4.7	6.0	5.0
11	20.8	20.3	11.5	12.7	15.7	8.5	8.3	7.2	7.7	4.8	5.8	5.0
12	21.1	19.3	11.2	11.1	14.8	8.4	8.7	7.4	7.8	4.9	5.6	5.1
13	20.9	18.0	11.0	11.9	14.0	8.4	8.9	7.1	7.4	5.2	5.4	5.2
14	20.6	17.0	10.8	11.6	13.2	8.3	9.0	6.7	7.0	5.5	5.3	5.3
15	20.5	16.8	10.5	10.8	12.5	8.2	9.0	6.3	6.6	5.9	5.1	5.7
16	20.2	17.0	10.5	11.1	12.0	7.9	8.7	6.0	6.2	5.2	4.9	6.1
17	19.5	17.4	10.3	10.9	11.3	7.6	8.5	5.7	6.0	5.1	4.8	6.3
18	18.6	17.9	10.2	11.9	11.0	7.3	8.4	5.5	5.7	5.0	5.0	6.1
19	17.5	18.5	10.1	13.1	10.7	7.1	7.8	5.2	5.6	4.9	5.3	5.8
20	16.7	18.8	9.8	13.5	10.4	7.1	7.6	5.4	5.6	4.7	5.3	5.5
21	15.6	19.1	9.6	14.0	10.4	7.1	7.6	5.0	5.6	4.6	5.3	5.3
22	14.7	19.5	9.6	14.2	10.4	7.1	8.1	5.1	5.3	4.6	5.2	5.2
23	14.0	20.0	10.0	14.3	10.4	7.1	8.3	6.4	5.1	4.6	5.0	5.2
24	13.4	20.0	12.7	14.0	10.4	7.1	8.3	6.8	5.6	4.6	5.0	5.2
25	13.0	20.0	15.7	13.6	10.2	7.1	7.7	6.6	5.7	4.6	5.0	5.5
26	12.8	19.5	21.8	13.8	10.0	7.5	7.5	7.5	5.7	4.6	5.0	6.4
27	12.7	18.8	24.1	14.1	9.8	7.5	7.3	8.8	5.7	4.6	4.9	7.0
28	12.5	17.5	25.6	15.5	9.8	7.7	7.7	10.0	5.7	4.6	4.7	7.8
29	11.3	16.2	25.8	18.1	10.1	7.6	8.0	10.5	5.7	4.6	4.7	8.4
30	12.1	.....	25.4	20.2	10.1	7.3	8.0	10.7	5.7	4.6	4.7	9.0
31	11.8	.....	24.8	.....	9.9	.....	7.4	10.9	.....	4.7	.....	9.5

KINCHAFOONEE CREEK NEAR LEESBURG, GA.

The station is located at the iron highway bridge 1 mile east of Leesburg. It was established August 30, 1905.

The datum of the vertical gage and the present chain gage have remained the same since the establishment of the station. The right bank is lower than the bridge and probably overflows at extreme high stages around the end of the bridge approach. The left bank does not overflow. Conditions of flow are probably permanent and a very good rating has been developed for low and medium stages.[a]

Discharge measurements of Kinchafoonee Creek near Leesburg, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 19	M. R. Hall	107	342	2.72	503
April 20	F. A. Murray	113	403	3.20	664
August 22	Warren E. Hall	115	374	3.29	586
1908.					
January 2	Warren E. Hall	158	1,020	7.85	2,230
February 12	do	154	960	7.51	1,960
June 10	do	108	314	2.30	416
August 20	do	90	213	1.25	263

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Kinchafoonee Creek near Leesburg, Ga., for 1907 and 1908.

[Observer, J. H. Jones.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.5	3.7	3.3	1.7	3.1	1.4	1.8	2.65	.....	9.5	1.6	.....
2	3.6	4.1	3.4	1.7	3.2	1.4	1.6	3.95	1.4	8.8	1.6	7.2
3	3.6	4.4	3.5	1.7	3.5	1.4	1.7	3.15	1.3	7.8	.....	7.0
4	3.7	4.7	3.6	1.6	3.3	1.3	.....	.....	1.45	6.8	1.8	7.0
5	3.8	5.1	3.5	1.5	3.1	1.3	3.5	4.15	2.1	4.95	1.9	6.6
6	3.8	5.2	3.5	2.7	2.8	1.3	3.9	4.8	2.9	.....	1.8	6.0
7	3.7	5.1	3.3	3.1	2.5	1.3	.....	6.9	2.9	2.9	1.8	5.4
8	3.6	5.0	3.1	3.4	2.3	1.3	2.1	6.9	.....	2.55	1.65	.....
9	3.6	4.9	2.9	4.1	2.0	1.2	1.4	6.1	2.45	2.75	1.6	4.6
10	3.5	4.7	2.8	5.0	2.8	1.2	1.1	5.45	2.05	2.6	.....	5.1
11	3.4	4.5	2.7	5.6	3.1	1.2	1.0	.....	2.4	2.6	1.85	5.9
12	3.3	4.1	2.6	4.4	3.5	1.1	1.1	7.6	2.35	2.5	2.15	6.6
13	3.2	3.7	2.6	3.3	3.8	1.1	1.0	9.2	2.35	.....	2.45	7.2
14	3.1	3.4	2.6	3.0	3.6	1.1	.....	9.1	2.1	2.4	2.7	8.4
15	3.0	3.2	2.7	2.9	3.0	1.1	1.0	8.8	.....	2.3	2.55	.....
16	3.0	3.0	2.9	2.8	3.5	1.2	1.2	8.4	2.4	2.2	2.4	10.6
17	2.8	2.8	3.1	2.7	3.9	1.3	1.6	7.0	2.25	2.05	.....	11.2
18	2.7	2.7	3.2	2.5	4.0	1.2	1.8	.....	1.95	1.9	2.4	10.2
19	2.6	2.8	3.3	2.6	3.7	1.1	2.0	3.65	1.9	1.85	2.4	8.9
20	2.7	3.0	3.5	3.0	3.3	1.0	1.7	3.5	1.85	.....	2.4	7.8
21	2.9	3.1	3.1	3.2	2.7	1.0	.....	3.45	1.45	1.7	2.6	7.0
22	2.9	3.0	2.8	3.5	2.5	.9	1.2	2.95	.....	1.6	3.7	.....
23	2.8	3.0	2.6	4.6	2.4	1.0	1.1	2.6	2.2	1.5	4.35	8.1
24	2.8	3.0	2.6	5.1	2.3	1.2	.9	2.7	2.45	1.45	.....	8.8
25	2.7	2.9	2.5	5.6	2.0	.9	.9	.....	2.25	1.4	5.2	.....
26	2.7	3.0	2.3	5.8	1.9	.9	1.3	2.15	2.05	1.4	6.5	10.0
27	2.9	3.2	2.2	5.1	1.8	.9	1.2	2.0	2.0	.....	7.1	9.3
28	3.2	3.3	2.2	4.5	1.8	1.0	.....	1.85	2.15	1.5	.....	8.2
29	3.4	.....	2.0	3.8	1.6	1.3	1.7	1.65	.....	1.6	7.0	.....
30	3.5	.....	1.9	3.4	1.5	1.5	2.3	1.5	8.4	1.7	7.4	7.8
31	3.4	.....	1.8	.....	1.5	.....	2.8	1.65	.....	1.6	.....	7.8
1908.												
1	.....	7.3	.....	6.8	11.2	2.6	1.85	2.25	1.9	1.4	.....	1.5
2	7.0	.....	6.0	6.5	9.9	2.6	1.7	.....	1.8	1.3	2.1	1.75
3	8.0	15.7	6.0	6.2	.....	2.45	1.6	2.05	1.75	1.2	2.0	2.1
4	7.9	15.5	5.6	5.9	7.8	2.4	.....	1.85	1.8	.....	1.95	2.5
5	.....	12.9	5.2	.....	7.1	2.4	.....	1.6	1.7	1.1	2.15	2.35
6	7.1	10.5	5.0	5.4	6.5	2.7	2.55	1.35	.....	1.1	2.45	.....
7	8.4	9.0	5.0	5.0	5.9	.....	2.55	1.45	1.9	1.1	2.4	1.9
8	10.2	8.4	.....	5.0	5.8	2.75	2.4	1.5	1.85	1.1	.....	1.9
9	11.5	.....	4.9	5.0	5.8	2.55	2.25	.....	1.75	1.15	2.2	1.8
10	11.1	7.4	4.8	4.9	.....	2.25	2.0	2.35	1.6	1.35	2.15	1.8
11	11.4	7.8	4.8	4.8	5.4	2.1	2.45	2.5	1.5	.....	2.0	2.05
12	.....	7.6	4.7	.....	4.8	2.0	.....	2.25	1.5	1.65	2.0	2.25
13	10.1	7.5	4.6	4.6	4.3	1.9	2.45	2.1	.....	1.55	2.0	.....
14	9.4	7.5	4.5	4.2	3.9	.....	2.4	1.85	1.3	1.45	2.0	2.9
15	8.7	8.4	.....	4.0	3.6	2.0	2.35	1.65	1.2	1.4	.....	3.15
16	7.8	.....	4.4	3.9	3.4	2.0	2.3	.....	1.45	1.3	1.8	2.95
17	7.3	8.3	4.3	4.0	.....	1.95	2.4	1.35	1.4	1.3	1.7	2.5
18	7.0	8.6	4.3	4.4	3.1	1.9	2.55	1.25	1.25	.....	1.6	2.1
19	.....	9.4	4.2	.....	3.1	1.8	.....	1.1	1.1	1.2	1.7	2.0
20	6.4	9.2	4.0	4.6	3.1	1.8	5.2	1.1	.....	1.1	1.7	.....
21	6.1	8.8	4.0	4.6	3.0	.....	5.8	1.1	1.4	1.1	1.7	1.8
22	6.0	.....	.....	4.4	2.9	2.0	4.5	1.25	1.55	1.1	.....	1.9
23	6.0	.....	6.6	4.6	2.8	2.05	2.85	.....	1.75	1.0	1.7	2.25
24	6.0	8.0	10.3	4.7	.....	2.15	2.5	2.35	1.9	1.0	1.65	2.45
25	5.9	7.4	17.2	4.6	2.6	2.4	2.6	2.85	1.8	.....	1.6	.....
26	.....	6.8	16.8	.....	2.85	2.9	.....	3.6	1.55	1.0	.....	2.7
27	5.8	6.6	14.6	8.4	3.1	3.0	4.0	4.1	.....	1.1	1.6	.....
28	5.6	6.2	13.0	9.4	2.95	.....	3.2	4.6	1.6	1.15	1.6	2.5
29	5.5	6.2	.....	9.9	2.8	2.7	2.7	4.7	1.7	1.4	.....	2.35
30	5.5	.....	8.8	10.8	.....	2.1	2.45	.....	1.5	1.85	1.5	2.05
31	5.6	.....	7.7	.....	.....	.....	2.35	2.05	.....	1.9	.....	1.9

Rating table for Kinchafoonee Creek near Leesburg, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	209	2.40	444	3.90	754	6.60	1,597
1.00	222	2.50	462	4.00	778	6.80	1,682
1.10	236	2.60	481	4.20	827	7.00	1,770
1.20	250	2.70	500	4.40	878	8.00	2,250
1.30	264	2.80	519	4.60	931	9.00	2,800
1.40	279	2.90	539	4.80	986	10.00	3,400
1.50	294	3.00	559	5.00	1,043	11.00	4,050
1.60	309	3.10	579	5.20	1,102	12.00	4,700
1.70	325	3.20	600	5.40	1,164	13.00	5,400
1.80	341	3.30	621	5.60	1,229	14.00	6,100
1.90	357	3.40	642	5.80	1,296	15.00	6,850
2.00	374	3.50	664	6.00	1,366	16.00	7,600
2.10	391	3.60	686	6.20	1,439	17.00	8,350
2.20	408	3.70	708	6.40	1,516	18.00	9,100
2.30	426	3.80	731				

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 13 discharge measurements made during 1905–1908 and is well defined below gage height 9 feet.

Monthly discharge of Kinchafoonee Creek near Leesburg, Ga., for 1907 and 1908.

[Drainage area, 480 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	731	481	604	1.26	1.45	A.
February	1,100	500	731	1.52	1.58	A.
March	686	341	532	1.11	1.28	A.
April	1,300	294	688	1.44	1.61	A.
May	778	294	524	1.09	1.26	A.
June	294	209	246	.512	.57	A.
July	754	209	334	.696	.80	A.
August	2,920	294	1,100	2.29	2.64	A.
September	2,470	264	499	1.04	1.16	A.
October	3,100	279	672	1.40	1.61	A.
November	1,950	309	690	1.44	1.61	A.
December	4,180	931	2,210	4.60	5.30	B.
The year	4,180	209	736	1.53	20.87	
1908.						
January	4,380	1,200	2,170	4.52	5.21	B.
February	7,380	1,440	2,820	5.88	6.34	B.
March	8,500	778	2,100	4.38	5.05	B.
April	3,920	754	1,350	2.81	3.14	A.
May	4,180	481	1,100	2.29	2.64	A.
June	559	341	428	.892	1.00	A.
July	1,300	309	532	1.11	1.28	A.
August	958	236	418	.871	1.00	A.
September	357	236	308	.642	.72	A.
October	357	222	260	.542	.62	A.
November	453	294	355	.740	.83	A.
December	590	294	416	.867	1.00	A.
The year	8,500	222	1,020	2.13	28.83	

NOTE.—Discharge interpolated for all days when the gage was not read.

ICHAWAYNOCHAWAY CREEK AT MILFORD, GA.

The station is located at the wagon bridge at Milford, Ga. It was established August 29, 1905, and was discontinued December 31, 1907.

Gage heights for 1905 and 1906 are from a standard chain gage attached to the downstream side of the bridge located about 100 feet

above the remains of an old wooden dam, which retains the water at a higher level than it would otherwise have. During 1907 a vertical staff gage located below the old dam was used. Its datum is several feet lower than that of the chain gage and variation of the water surface at the two gages is radically different.

A relation was established between the two gages and an approximate rating was developed which is applicable to the 1907 gage heights.[a]

Discharge measurements of Ichawaynochaway Creek at Milford, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.[b]	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 22	M. R. Hall	120	496	3.18	690
Do	do	120	499	3.19	705
April 27	F. A. Murray	142	735	6.18	1,790
August 21	Warren E. Hall	124	485	2.91	666

Daily gage height, in feet, of Ichawaynochaway Creek at Milford, Ga., for 1907.

[Observer, W. J. Kidd.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.0	3.4	3.9	3.3	4.55	1.9	1.3	2.4	1.8	11.9	2.35	5.3
2	5.0	3.5	4.0	3.4	4.5	1.85	1.4	2.6	1.8	8.6	2.35	5.2
3	4.8	4.0	4.05	3.7	4.4	1.85	1.5	3.0	1.75	6.5	2.35	5.1
4	4.5	4.3	4.0	4.0	3.9	1.8	1.6	3.0	2.0	5.6	2.35	4.8
5	4.5	4.6	3.85	4.3	3.8	1.8	1.9	2.9	2.5	5.1	2.3	4.6
6	4.5	4.8	3.6	4.8	3.6	1.8	2.15	2.8	2.6	4.6	2.25	4.5
7	4.35	5.0	3.2	5.3	3.45	1.75	2.3	2.9	2.6	4.4	2.2	4.4
8	4.35	4.9	3.1	6.2	3.4	1.75	2.35	3.1	2.7	4.4	2.3	4.5
9	4.2	4.75	3.0	7.0	3.4	1.8	2.0	3.5	2.75	4.3	2.3	4.7
10	4.2	4.65	2.9	6.5	3.5	1.9	1.9	3.4	2.7	4.0	2.35	4.9
11	3.9	4.5	2.9	5.4	3.45	2.1	1.9	3.2	2.65	3.7	2.4	5.1
12	3.9	4.1	3.0	5.1	3.4	2.0	1.9	3.2	2.6	3.4	2.5	5.5
13	4.05	3.6	3.1	4.8	3.2	1.9	1.9	3.3	2.6	3.1	2.6	6.1
14	3.9	3.2	3.2	4.3	3.1	1.9	1.85	3.5	2.55	2.9	2.7	7.7
15	3.9	3.1	3.3	4.2	3.0	1.85	1.85	4.0	2.5	2.9	2.75	8.5
16	3.75	3.0	3.4	3.7	3.0	1.8	1.8	5.9	2.5	2.85	2.8	9.1
17	3.6	3.05	3.5	3.2	2.9	1.75	1.8	4.0	2.4	2.8	3.1	9.5
18	3.3	3.1	3.5	3.5	2.9	1.7	1.8	3.5	2.3	2.8	3.3	9.2
19	3.3	3.2	3.4	3.8	2.8	1.65	1.75	3.0	2.3	2.7	3.6	8.7
20	3.15	3.3	3.2	3.5	2.7	1.6	1.75	2.4	2.2	2.7	3.95	8.2
21	3.15	3.4	3.0	4.0	2.5	1.55	1.7	3.0	2.0	2.6	4.2	7.5
22	3.15	3.5	2.8	4.2	2.4	1.5	1.7	2.6	2.9	2.55	4.4	6.8
23	3.1	3.5	2.75	4.9	2.3	1.5	1.7	2.0	3.1	2.55	4.5	6.3
24	3.05	3.55	2.7	5.4	2.2	1.45	1.7	2.0	3.2	2.5	4.6	6.1
25	3.0	3.55	2.7	6.0	2.2	1.45	1.7	1.95	3.35	2.5	4.7	6.0
26	3.1	3.6	2.6	7.0	2.2	1.4	2.9	1.95	3.75	2.45	4.75	6.2
27	3.2	3.7	2.5	6.5	2.15	1.3	3.5	1.9	4.0	2.45	4.8	6.4
28	3.7	3.8	2.4	6.0	2.1	1.3	3.0	1.9	4.5	2.45	4.9	6.35
29	3.6	.....	2.4	5.4	2.1	1.25	3.1	1.85	7.0	2.4	5.0	6.1
30	3.4	.....	2.35	4.6	2.05	1.2	2.9	1.85	10.5	2.4	5.2	5.7
31	3.3	.....	2.3	.....	2.0	.....	2.5	1.8	.....	2.4	.....	5.6

NOTE.—New staff gage installed January 27. By means of simultaneous readings on the two gages a relation between the two has been established and gage heights January 1–27 referred to the new gage.

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

[b] 1907 gage heights refer to the new gage.

Rating table for Ichawaynochaway Creek at Milford, Ga., for 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.20	335	2.70	605	4.20	1,000	6.20	1,800
1.30	350	2.80	625	4.30	1,030	6.40	1,900
1.40	365	2.90	645	4.40	1,065	6.60	2,000
1.50	380	3.00	665	4.50	1,100	6.80	2,100
1.60	395	3.10	690	4.60	1,135	7.00	2,200
1.70	410	3.20	715	4.70	1,170	7.20	2,320
1.80	425	3.30	740	4.80	1,205	7.40	2,440
1.90	445	3.40	765	4.90	1,240	7.60	2,560
2.00	465	3.50	790	5.00	1,280	7.80	2,680
2.10	485	3.60	820	5.20	1,360	8.00	2,800
2.20	505	3.70	850	5.40	1,440	9.00	3,500
2.30	525	3.80	880	5.60	1,520	10.00	4,200
2.40	545	3.90	910	5.80	1,600	11.00	5,000
2.50	565	4.00	940	6.00	1,700	12.00	5,800
2.60	585	4.10	970				

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 12 discharge measurements made during 1905-1907 and is not well defined.

Monthly discharge of Ichawaynochaway Creek at Milford, Ga., for 1907.

[Drainage area, 640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
January	1,280	665	892	1.39	1.60	C.
February	1,280	665	893	1.40	1.46	C.
March	955	525	705	1.10	1.27	C.
April	2,200	715	1,250	1.95	2.18	C.
May	1,120	465	688	1.08	1.24	C.
June	485	335	408	.638	.71	C.
July	790	350	476	.744	.86	C.
August	1,650	425	658	1.03	1.19	C.
September	4,600	418	794	1.24	1.38	C.
October	5,720	545	1,030	1.61	1.86	C.
November	1,360	505	791	1.24	1.38	C.
December	3,850	1,060	1,940	3.03	3.49	C.
The year	5,720	335	877	1.37	18.62	

MISCELLANEOUS MEASUREMENT IN APALACHICOLA RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurement was made in Apalachicola River drainage basin:

March 28, 1907: Cane Creek, tributary to Flint River at foot log near mouth of creek near Woodbury, Ga.: Gage height, 0.65 foot; discharge, 63 second-feet.

RIVER SURVEYS AND WATER POWER IN APALACHICOLA RIVER DRAINAGE BASIN.

Surveys have been made in the Apalachicola River drainage basin as follows:

Chattahoochee River from Columbus to Nacoochee, Ga.[a]

Soque River from mouth to Clarksville, Ga.[a] [b]

[a] Elevations taken on these surveys and brief statements regarding possible power development are given in Water-Supply Paper No. 197, Water resources of Georgia.

[b] River surveys and profiles of 1903: Water-Supply Paper U. S. Geol. Survey No. 115, 1905.

Chestatee River from mouth to Willow, Ga.[a] [b]

Flint River from Woodbury, Ga., to line of Creek Agency Reserve, near Roberta, Ga.[a]

Chattahoochee River from Keith's bridge at mouth of Chestatee River to Nacoochee, Ga.[b]

Chattahoochee River from Chattahoochee to Franklin, Ga.[b]

Chattahoochee River from West Point to Columbus, Ga.[b]

CHOCTAWHATCHEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Choctawhatchee River drains the southeastern part of Alabama and that portion of Florida lying immediately south. The main river rises in Barbour County, Ala., a short distance west of Eufaula, Ala., and flows in a southwesterly and southerly direction through Choctawhatchee Bay to the Gulf of Mexico. Pea River is the principal tributary and enters from the west at Geneva, Ala. This branch is the longer of the two above the junction, having its head in Bullock County near Union Springs, Ala.

These are moderately swift streams, even at low water, and at places the fall is sufficient to make considerable shoals or rapids and offer practicable sites for water-power development.

The following gaging stations have been maintained in this river basin:

Choctawhatchee River, Newport, Ala., 1906–1908.
Choctawhatchee River, Geneva, Ala., 1904.
Double Bridges Creek, Geneva, Ala., 1904.
Pea River, Elba, Ala., 1906.
Pea River, Pera, Ala., 1904–1908.

CHOCTAWHATCHEE RIVER NEAR NEWTON, ALA.

The station is located at the steel highway bridge 1 mile north of Newton and about the same distance from Elba Junction. Gage height records have been obtained for a portion of the time only, as it has been difficult to keep an observer. The station was originally established June 11, 1906, and records of discharge have been obtained from June 11 to October 13, 1906, and from April 22, 1907, to August 22, 1908. The gage used during 1906 was at Elba Junction, about 1 mile above the present station, but these readings were changed to agree with the Newton gage.

Both banks are high and not liable to overflow. Conditions of flow are probably permanent, and an excellent rating has been developed for low-water stages.

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[a] Elevations taken on these surveys and brief statements regarding possible power development are given in Water-Supply Paper No. 197, Water resources of Georgia.

[b] River surveys and profiles of 1903: Water-Supply Paper U. S. Geol. Survey No. 115, 1905.

Discharge measurements of Choctawhatchee River near Newton, Ala., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
January 23	M. R. Hall	113	198	3.76	747
April 22	F. A. Murray	117	361	4.88	1,720
April 25	do	119	433	5.49	2,200
November 22	Warren E. Hall	113	274	4.32	1,130
1908.					
June 15	Warren E. Hall	115	176	3.46	572

Daily gage height, in feet, of Choctawhatchee River near Newton, Ala., for 1907 and 1908.

[Observer, A. E. Killebrew.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1					5.4	3.2	2.95	3.6	2.75	6.0	3.0	5.7
2					5.7	3.2	3.35	3.55	2.75	5.3	3.2	5.3
3					5.0	3.15	3.6	3.5	2.6	5.1	3.2	5.0
4					4.7	3.0	3.8	3.35	4.0	4.3	3.4	4.6
5					4.4	2.9	3.7	3.2	3.9	4.1	3.3	4.2
6					4.2	2.9	3.65	3.3	3.65	4.1	3.15	4.1
7					3.95	2.9	3.45	3.2	3.2	4.0	3.1	4.0
8					3.8	2.9	3.35	3.35	3.3	4.0	3.1	4.7
9					3.95	2.75	3.15	3.5	3.35	3.9	3.1	7.7
10					4.2	2.7	2.9	3.75	3.3	3.75	3.3	7.4
11					4.3	2.7	2.7	5.7	3.2	3.7	3.2	6.0
12					4.2	3.0	2.6	5.3	3.45	3.55	3.4	5.7
13					3.85	3.35	2.45	4.3	3.35	3.4	3.5	9.2
14					3.7	3.15	3.05	3.9	3.25	3.3	3.35	9.6
15					4.0	2.85	3.9	3.4	3.15	3.15	3.25	9.4
16					4.3	2.65	3.75	3.3	2.85	3.1	3.2	8.5
17					4.2	2.55	3.45	3.15	2.85	3.0	3.15	7.0
18					3.95	2.5	3.8	3.0	2.75	3.1	3.3	5.8
19					3.8	2.4	3.65	2.9	2.85	3.1	3.4	5.2
20					3.55	2.5	3.35	2.75	3.6	3.05	3.4	4.8
21					3.4	2.4	3.15	2.85	4.2	3.0	3.7	4.6
22				4.9	3.3	2.5	3.05	3.0	4.6	3.0	4.4	6.0
23				6.6	3.15	2.5	2.85	3.35	5.0	3.0	5.4	9.0
24				6.2	3.2	2.6	2.8	3.1	4.9	3.0	6.0	8.8
25				5.6	3.2	2.7	3.1	4.2	3.85	3.0	5.4	7.8
26				5.2	3.3	2.9	3.2	5.0	3.75	3.0	5.0	6.3
27				4.8	3.4	2.9	5.4	4.6	3.8	3.0	4.5	6.0
28				4.4	3.4	2.9	5.0	4.4	7.2	3.3	6.2	7.6
29				4.9	3.3	2.9	4.6	3.9	10.3	3.2	6.6	8.7
30				5.4	3.2	2.8	4.2	3.4	7.4	3.15	6.2	9.2
31					3.2		3.75	2.85		3.1		9.0
1908.												
1	8.8	12.8	5.0	5.4	7.6	3.85		3.25				
2	7.4	11.7	4.8	5.2	6.1	3.8		3.75				
3	6.2	9.0	4.6	5.1	5.6	3.8		3.55				
4	6.5	7.5	4.6	5.0	5.4	3.8		3.5				
5	5.9	6.6	4.6	4.8	5.2	3.7	3.8	3.2				
6	7.4	6.0	4.5	4.7	5.8	3.7	3.6	3.0				
7	11.6	5.6	4.5	5.2	6.0	3.6	3.25	3.0				
8	10.0	5.2	4.4	5.1	5.8	3.55	2.15	2.9				
9	9.4	5.6	4.4	4.8	5.6	3.9	3.65	3.75				
10	8.9	6.6	4.3	4.6	5.4	3.8	3.65	3.55				
11	8.5	6.1	4.2	4.5	5.0	3.7	3.9	3.5				
12	7.9	5.8	4.2	4.4	4.8	3.6	4.05	3.2				
13	7.1	6.0	4.9	4.2	4.5	3.6	3.95	3.0				
14	6.6	6.5	5.1	4.2	4.2	3.5	3.95	3.0				
15	6.4	6.6	4.4	5.2	4.2	3.5	3.95	2.9				
16	6.0	6.2	4.2	5.1	4.1	3.4	3.7	2.85				
17	5.8	5.7	4.2	4.8	4.1	3.55	3.45	2.7				
18	5.6	5.4	4.1	4.6	4.0	3.5	3.3	2.6				
19	5.4	9.6	4.1	4.6	4.0	3.35	3.35	2.85				
20	5.2	7.8	4.2	4.5	3.9	3.25	3.75	3.0				

Daily gage height, in feet, of Choctawhatchee River near Newton, Ala., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	5.0	6.8	4.2	4.4	3.9	3.2	3.75	3.65	.....	.....	.....	.....
22	5.0	6.2	5.2	7.0	3.8	3.5	4.15	3.9	.....	.....	.....	.....
23	4.9	5.5	12.0	6.4	3.8	3.4	4.25	.....	.....	.....	.....	.....
24	4.8	5.1	20.6	6.0	3.7	3.4	4.25	.....	.....	.....	.....	.....
25	5.2	5.0	24.2	9.5	3.6	3.3	6.0	.....	.....	.....	.....	.....
26	5.0	5.8	15.5	9.0	3.5	3.1	4.8	.....	.....	.....	.....	.....
27	4.8	5.4	8.8	17.8	3.65	3.1	4.4	.....	.....	.....	.....	.....
28	4.8	5.2	7.0	21.5	4.6	3.0	3.95	.....	.....	.....	.....	.....
29	4.6	5.0	6.2	13.8	4.2	2.95	3.6	.....	.....	.....	.....	.....
30	4.7	.....	5.8	10.0	3.95	2.9	3.5	.....	.....	.....	.....	.....
31	5.8	.....	5.5	.....	3.9	.....	3.4	.....	.....	.....	.....	.....

Daily discharge, in second-feet, of Choctawhatchee River near Newton, Ala., for 1906, 1907, and 1908.

Day.	June.	July.	Aug.	Sept.	Oct.	Day.	June.	July.	Aug.	Sept.	Oct.
1906.						1906.					
1		650	510	330	1,290	17	1,200	1,290	430	250	.....
2		1,290	430	330	1,740	18	970	1,290	470	250	.....
3		555	360	330	1,830	19	770	1,290	330	300	.....
4		470	300	330	1,830	20	470	1,120	250	360	.....
5		470	350	202	1,120						
						21	430	650	250	510	.....
6		470	350	202	1,740	22	345	600	250	830	.....
7		430	350	395	1,740	23	330	470	330	600	.....
8		300	350	770	1,650	24	300	510	395	395	.....
9		470	350	970	1,470	25	300	600	830	395	.....
10		510	350	1,120	1,120						
						26	300	770	510	395	.....
11	430	710	350	1,740	900	27	430	1,120	430	395	.....
12	510	1,380	300	1,120	900	28	430	1,290	430	970	.....
13	555	1,650	300	970	830	29	395	1,290	330	1,560	.....
14	600	1,290	510	430	.....	30	470	710	330	1,470	.....
15	1,040	1,290	600	395	.....	31	.....	600	330	.....	.....
16	1,290	1,290	830	250	.....						

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	2,110	470	378	650	315	2,710	395	2,410
2	.....	.....	.....	.....	2,410	470	532	625	315	2,010	470	2,010
3	.....	.....	.....	.....	1,740	450	650	600	275	1,830	470	1,740
4	.....	.....	.....	.....	1,470	395	770	532	900	1,120	555	1,380
5	.....	.....	.....	.....	1,200	360	710	470	830	970	510	1,040
6	.....	.....	.....	.....	1,040	360	680	510	680	970	450	970
7	.....	.....	.....	.....	865	360	578	470	470	900	430	900
8	.....	.....	.....	.....	770	360	532	532	510	900	430	1,470
9	.....	.....	.....	.....	865	315	450	600	532	830	430	.....
10	.....	.....	.....	.....	1,040	300	360	740	510	740	510	.....
11	.....	.....	.....	.....	1,120	300	300	2,410	470	710	470	2,710
12	.....	.....	.....	.....	1,040	395	275	2,010	578	625	555	2,410
13	.....	.....	.....	.....	800	532	238	1,120	532	555	600	.....
14	.....	.....	.....	.....	710	450	412	830	490	510	532	.....
15	.....	.....	.....	.....	900	345	830	555	450	450	490	.....
16	.....	.....	.....	.....	1,120	288	740	510	345	430	470	.....
17	.....	.....	.....	.....	1,040	262	578	450	345	395	450	.....
18	.....	.....	.....	.....	865	250	770	395	315	430	510	2,510
19	.....	.....	.....	.....	770	226	680	360	345	430	555	1,920
20	.....	.....	.....	.....	625	250	532	315	650	412	555	1,560
21	.....	.....	.....	.....	555	226	450	345	1,040	395	710	1,380
22	.....	.....	.....	1,650	510	250	412	395	1,380	395	1,200	2,710
23	.....	.....	.....	.....	450	250	345	532	1,740	395	2,110	.....
24	.....	.....	.....	.....	470	275	330	430	1,650	395	2,710	.....
25	.....	.....	.....	2,310	470	300	430	1,040	800	395	2,110	.....
26	.....	.....	.....	1,920	510	360	470	1,740	740	395	1,740	.....
27	.....	.....	.....	1,560	555	360	2,110	1,380	770	395	1,290	2,710
28	.....	.....	.....	1,200	555	360	1,740	1,200	.....	510	.....	.....
29	.....	.....	.....	1,650	510	360	1,380	830	.....	470	.....	.....
30	.....	.....	.....	2,110	470	330	1,040	555	.....	450	.....	.....
31	.....	.....	.....	.....	470	.....	740	345	.....	430	.....	.....

Daily discharge, in second-feet, of Choctawhatchee River near Newton, Ala., for 1906, 1907, and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	.....	.....	1,740	2,110	.....	800	375	490	.....	.....	.....	.....
2	.....	.....	1,560	1,920	.....	770	375	740	.....	.....	.....	.....
3	.....	.....	1,380	1,830	2,310	770	375	625	.....	.....	.....	.....
4	.....	.....	1,380	1,740	2,110	770	375	600	.....	.....	.....	.....
5	2,610	.....	1,380	1,560	1,920	710	770	470	.....	.....	.....	.....
6	.....	2,710	1,290	1,470	2,510	710	650	395	.....	.....	.....	.....
7	.....	2,310	1,290	1,920	2,710	650	490	395	.....	.....	.....	.....
8	.....	1,920	1,200	1,830	2,510	625	173	360	.....	.....	.....	.....
9	.....	2,310	1,200	1,560	2,310	830	680	740	.....	.....	.....	.....
10	.....	.....	1,120	1,380	2,110	770	680	625	.....	.....	.....	.....
11	.....	.....	1,040	1,290	1,740	710	830	600	.....	.....	.....	.....
12	.....	2,510	1,040	1,200	1,560	650	935	470	.....	.....	.....	.....
13	.....	2,710	1,650	1,040	1,290	650	865	395	.....	.....	.....	.....
14	.....	.....	1,830	1,040	1,040	600	865	395	.....	.....	.....	.....
15	.....	.....	1,200	1,920	1,040	600	865	360	.....	.....	.....	.....
16	2,710	.....	1,040	1,830	970	555	710	345	.....	.....	.....	.....
17	2,510	2,410	1,040	1,560	970	625	578	300	.....	.....	.....	.....
18	2,310	2,110	970	1,380	900	600	510	275	.....	.....	.....	.....
19	2,110	.....	970	1,380	900	532	532	345	.....	.....	.....	.....
20	1,920	.....	1,040	1,290	830	490	740	830	.....	.....	.....	.....
21	1,740	.....	1,040	1,200	830	470	740	680	.....	.....	.....	.....
22	1,740	.....	1,920	.....	770	600	1,000	830	.....	.....	.....	.....
23	1,650	2,210	.....	.....	770	555	1,080	.....	.....	.....	.....	.....
24	1,560	1,830	.....	2,710	710	555	1,080	.....	.....	.....	.....	.....
25	1,920	1,740	.....	.....	650	510	2,710	.....	.....	.....	.....	.....
26	1,740	2,510	.....	.....	600	430	1,560	.....	.....	.....	.....	.....
27	1,560	2,110	.....	.....	680	430	1,200	.....	.....	.....	.....	.....
28	1,560	1,920	.....	.....	1,380	395	865	.....	.....	.....	.....	.....
29	1,380	1,740	.....	.....	1,040	378	650	.....	.....	.....	.....	.....
30	1,470	.....	2,510	.....	865	360	600	.....	.....	.....	.....	.....
31	2,510	.....	2,210	.....	830	.....	555	.....	.....	.....	.....	.....

NOTE.—Daily discharge for 1906, 1907, and 1908 based on a well-defined rating curve. Discharge for missing days April 22, 1907, to August 22, 1908, greater than 2,800 second-feet. Discharge estimated August 5 to 11, 1906, and July 1–4, 1908.

PEA RIVER AT PERA, ALA.

The station is located at the Elton wagon bridge, about one-half mile west of Pera, a station on the Georgiana and Graceville branch of the Louisville and Nashville Railroad. It was established August 27, 1904.

The datum of the chain gage has remained the same since the establishment of the station. Both banks are subject to overflow during extreme high water. Conditions of flow appear to be very nearly permanent and a good rating has been developed.

Discharge measurements of Pea River at Pera, Ala., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 23	F. A. Murray	114	1,650	18.54	6,660
Do	do	114	1,660	18.57	6,700
November 25	Warren E. Hall	100	1,310	14.70	4,920
1908.					
June 18	Warren E. Hall	80	518	4.58	654

Daily gage height, in feet, of Pea River at Pera, Ala., for 1907 and 1908.

[Observer, W. G. Early.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	17.3	7.8	9.4	4.9	10.2	5.2	3.8	7.8	3.6	10.8	4.1	14.8
2	14.9	7.5	13.4	5.2	10.0	5.2	4.8	6.6	3.35	8.8	4.2	13.8
3	12.6	7.0	13.2	5.1	10.0	5.0	6.0	5.6	3.45	7.8	5.6	13.0
4	11.9	6.8	13.0	5.1	10.5	4.7	6.6	7.0	8.9	6.8	4.6	12.4
5	12.3	13.5	11.0	5.0	9.2	4.5	6.2	7.0	10.4	6.2	4.0	10.8
6	11.1	13.9	11.4	17.1	7.8	4.4	5.7	7.1	6.6	7.6	4.2	9.4
7	10.0	10.7	11.6	16.2	7.0	4.2	5.3	7.0	5.6	6.6	3.95	8.5
8	8.4	9.7	9.9	10.3	7.8	4.0	4.8	6.0	4.6	6.2	3.8	8.0
9	7.6	9.1	8.4	9.6	10.4	4.0	4.4	6.4	9.0	7.6	3.9	10.0
10	7.1	8.9	7.7	9.6	9.8	3.8	4.0	8.8	8.0	6.3	3.95	15.9
11	7.0	8.5	7.2	9.3	9.2	3.8	3.5	10.7	6.4	5.5	4.2	15.8
12	6.7	7.9	6.7	9.0	8.4	3.8	3.75	11.4	5.6	5.2	4.5	12.6
13	6.4	7.4	6.5	6.3	7.8	3.8	4.1	10.0	5.0	4.8	4.8	13.3
14	6.3	6.5	6.4	6.0	7.4	4.0	4.6	12.3	4.8	4.6	4.6	18.7
15	6.1	6.2	6.4	5.5	14.6	3.9	5.8	7.2	4.4	4.4	4.5	18.8
16	6.0	6.1	9.2	5.2	16.8	3.55	8.8	5.8	4.5	4.4	4.4	18.2
17	5.9	6.0	8.6	5.2	11.2	3.35	7.5	5.2	4.2	4.2	4.3	16.0
18	5.9	5.8	8.8	6.2	9.2	3.5	6.6	4.6	3.85	4.2	4.6	15.1
19	5.9	5.6	8.8	6.5	7.7	3.6	5.6	4.2	3.75	4.2	5.0	14.0
20	5.9	7.2	9.8	12.2	7.0	3.4	5.3	4.2	3.65	4.1	4.8	12.1
21	6.7	7.0	8.7	11.5	6.6	3.2	4.4	4.4	3.85	3.95	7.0	11.1
22	6.4	6.8	8.3	10.2	6.0	3.2	4.0	4.4	6.0	4.0	11.3	11.4
23	5.9	5.9	6.5	16.4	5.5	3.25	4.1	4.2	10.2	4.0	16.2	20.3
24	5.7	5.8	6.5	17.4	5.5	3.2	3.95	4.1	7.8	4.3	14.9	22.2
25	5.4	5.8	5.8	15.0	6.2	3.6	3.5	9.3	5.8	4.1	12.6	21.0
26	6.8	7.5	5.6	12.9	6.1	5.1	3.4	9.6	6.8	4.1	11.2	19.6
27	8.3	8.9	5.5	11.8	5.6	4.8	3.55	6.1	5.9	4.0	11.2	19.2
28	7.3	8.0	5.3	10.9	6.4	4.6	5.0	5.3	6.2	4.2	14.6	18.4
29	6.8	.....	5.3	9.7	6.0	4.2	8.6	4.5	17.2	3.9	16.0	20.8
30	6.5	.....	5.0	9.8	5.4	4.3	8.5	4.0	15.7	3.7	17.3	22.3
31	6.8	.....	4.8	.....	5.3	.....	7.6	3.85	.....	3.85	.....	22.4
1908.												
1	22.8	21.0	10.4	12.6	23.4	7.5	4.0	4.9	4.0	4.2	4.6	3.85
2	22.8	26.0	10.1	11.6	21.8	6.6	4.2	5.1	3.8	3.85	4.4	4.0
3	22.4	24.5	9.8	10.6	19.0	5.9	4.8	5.2	3.55	3.6	4.4	4.1
4	20.2	24.5	9.4	10.0	15.0	5.6	4.6	4.8	4.3	3.85	5.2	4.2
5	16.6	26.0	9.2	9.6	12.2	6.6	6.6	4.4	5.1	3.15	6.8	4.2
6	15.3	22.9	9.0	9.3	14.2	6.0	7.1	4.4	6.9	3.15	6.4	3.9
7	19.1	18.0	8.8	9.4	15.0	6.6	6.1	4.4	7.4	3.05	6.0	3.85
8	22.6	14.0	8.6	10.0	14.2	6.0	5.3	4.4	5.4	2.95	4.9	4.0
9	21.7	12.5	8.4	9.8	13.8	5.4	4.8	5.2	5.2	4.9	4.5	3.9
10	20.1	13.4	8.2	9.6	12.6	5.1	7.8	5.3	4.9	6.0	4.3	3.85
11	20.3	15.6	8.2	9.1	11.8	5.0	6.7	4.6	4.5	4.9	4.0	3.85
12	20.4	14.4	8.1	8.6	10.2	5.8	5.0	4.1	4.2	4.4	4.2	4.0
13	19.0	13.3	8.0	8.2	9.8	5.9	5.4	4.0	3.95	4.0	4.2	4.8
14	17.0	12.8	7.8	8.0	8.8	5.2	5.8	3.75	3.75	3.75	4.0	6.2
15	15.0	14.6	7.7	8.0	8.2	5.0	5.2	3.55	3.55	3.6	4.1	5.4
16	14.2	15.6	7.6	12.6	7.8	4.8	4.9	3.45	3.35	3.35	4.0	5.0
17	13.7	14.1	7.0	12.6	7.4	4.6	4.4	3.35	3.2	3.35	4.2	4.7
18	12.8	13.2	6.4	10.4	7.2	4.5	4.0	3.3	3.1	3.25	4.0	4.4
19	11.7	17.4	6.2	9.5	7.3	4.6	4.0	3.05	3.05	3.1	3.95	4.3
20	11.1	18.6	7.2	9.0	7.3	5.0	3.95	3.1	3.75	3.15	3.95	4.2
21	10.6	16.8	8.2	8.8	7.2	5.0	6.2	3.25	5.4	3.1	4.0	4.1
22	10.8	15.0	8.1	9.8	7.2	4.9	5.2	3.6	7.3	3.05	3.9	5.0
23	10.9	13.8	14.0	15.5	6.8	4.8	5.0	5.7	6.4	3.0	3.85	6.0
24	10.5	13.2	23.8	14.3	6.5	4.6	5.4	6.4	5.2	3.0	4.0	5.6
25	10.0	12.2	26.6	15.2	6.2	6.3	8.4	6.9	4.8	3.0	4.0	5.2
26	9.8	13.7	27.8	20.0	6.0	6.4	8.0	7.4	4.7	3.05	4.0	5.0
27	10.2	13.0	29.8	25.4	6.6	5.0	7.2	6.9	4.2	3.15	4.0	4.6
28	9.4	11.6	30.5	29.8	6.6	4.4	6.2	6.6	3.95	4.0	3.85	4.5
29	9.4	11.0	25.9	27.4	7.0	4.4	5.6	5.9	4.0	5.7	3.8	4.2
30	9.0	.....	19.9	25.8	8.2	4.2	5.6	5.1	4.2	5.4	3.8	4.2
31	9.6	.....	14.9	.....	8.6	.....	5.6	4.4	.....	5.0	.....	4.7

Rating table for Pea River at Pera, Ala., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.90	373	4.70	739	7.00	1,476	17.00	5,970
3.00	390	4.80	764	7.20	1,552	18.00	6,430
3.10	407	4.90	789	7.40	1,630	19.00	6,890
3.20	425	5.00	815	7.60	1,710	20.00	7,350
3.30	443	5.10	842	7.80	1,791	21.00	7,810
3.40	461	5.20	870	8.00	1,873	22.00	8,270
3.50	480	5.30	898	8.20	1,957	23.00	8,730
3.60	499	5.40	927	8.40	2,041	24.00	9,190
3.70	519	5.50	957	8.60	2,127	25.00	9,650
3.80	539	5.60	988	8.80	2,214	26.00	10,110
3.90	559	5.70	1,019	9.00	2,302	27.00	10,570
4.00	580	5.80	1,051	10.00	2,750	28.00	11,030
4.10	601	5.90	1,084	11.00	3,210	29.00	11,490
4.20	623	6.00	1,117	12.00	3,670	30.00	11,950
4.30	645	6.20	1,185	13.00	4,130	31.00	12,410
4.40	668	6.40	1,255	14.00	4,590		
4.50	691	6.60	1,327	15.00	5,050		
4.60	715	6.80	1,401	16.00	5,510		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 23 discharge measurements made during 1904–1908, and is well defined between gage heights 1.5 feet and 20 feet. Above gage height 10 feet the rating curve is a tangent, the difference being 46 per tenth.

Monthly discharge of Pea River at Pera, Ala., for 1907 and 1908.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	6,110	927	1,950	1.65	1.90	A.
February	4,540	988	1,830	1.55	1.61	A.
March	4,310	764	2,040	1.73	1.99	A.
April	6,150	789	2,640	2.24	2.50	A.
May	5,880	898	2,060	1.75	2.02	A.
June	870	425	597	.506	.56	B.
July	2,210	461	965	.818	.94	B.
August	3,810	549	1,440	1.22	1.41	A.
September	6,060	452	1,450	1.23	1.37	A.
October	3,120	519	980	.831	.96	B.
November	6,110	539	1,860	1.58	1.76	A.
December	8,450	1,870	5,270	4.47	5.15	A.
The year	8,450	425	1,920	1.63	22.17	
1908.						
January	8,640	2,300	5,110	4.33	4.99	A.
February	10,100	3,210	5,650	4.79	5.17	A.
March	12,200	1,180	4,060	3.44	3.97	A.
April	11,900	1,870	4,140	3.51	3.92	A.
May	8,910	1,120	3,010	2.55	2.94	A.
June	1,670	623	947	.803	.90	B.
July	2,040	570	1,020	.864	1.00	A.
August	1,630	398	788	.668	.77	B.
September	1,630	398	747	.633	.71	B.
October	1,120	382	552	.468	.54	B.
November	1,400	539	680	.576	.64	B.
December	1,180	549	705	.597	.69	B.
The year	12,200	382	2,280	1.94	26.24	

PEA RIVER AT ELBA, ALA.

The station was established June 8, 1906, and was discontinued December 31, 1906.

For information and data regarding stream flow at this point, see previous publications.[a]

ESCAMBIA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Escambia River drains the south central portion of Alabama and empties into the Gulf of Mexico through Escambia Bay and Pensacola Bay. Conecuh River joins the Escambia about 5 miles south of the Alabama-Florida state line, and is very much the larger of the two branches. Conecuh River rises in Bullock County, Ala., very close to the headwaters of Pea River, in the Choctawhatchee drainage basin, and flows southwestward throughout its course. Pigeon and Patsaliga creeks, both from the west, are the principal tributaries of Conecuh River. The Conecuh and its tributaries are swift streams, and at places there are rocky shoals and rapids.

The following gaging station has been maintained in this river basin:

Conecuh River at Beck, Ala., 1904–1908.

CONECUH RIVER AT BECK, ALA.

The station is located at Simmons Bridge, at Beck, about 12 miles below the mouth of Patsaliga Creek. The nearest railway station is Andalusia, Ala., 8 miles east on the Central of Georgia and Louisville and Nashville railroads. It was established August 24, 1904.

The datum of the chain gage has remained the same since the establishment of the station. Both banks are subject to overflow. Conditions of flow at this station are practically permanent, and an excellent rating has been developed.

Discharge measurements of Conecuh River at Beck, Ala., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 24	F. A. Murray	157	1,970	14.74	6,940
November 23	Warren E. Hall	133	1,420	10.74	4,770
Do	do	133	1,420	10.71	4,600
1908.					
June 16	Warren E. Hall	119	410	3.28	806

[a] Water-Supply Paper U. S. Geol. Survey No. 204, 1907.

Daily gage height, in feet, of Conecuh River at Beck, Ala., for 1907 and 1908.

[Observers, E. R. Spicer and J. F. Hicks.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.6	4.5	10.4	3.8	7.9	4.9	2.9	4.7	.....	5.0	2.1	.....
2	7.3	4.8	12.5	3.7	7.4	.....	3.1	4.3	.....	4.4	2.5	9.9
3	6.6	.....	12.1	3.8	7.1	4.1	4.0	4.4	3.1	3.8	.....	9.7
4	6.4	4.1	11.0	3.7	8.0	3.8	4.4	.....	2.6	3.6	2.5	9.4
5	6.4	4.0	10.5	3.5	.....	3.6	5.0	5.0	2.6	3.2	2.7	8.6
6	6.6	3.9	10.9	9.9	7.0	3.4	4.4	4.2	2.8	.....	2.7	8.1
7	6.4	3.7	12.1	.....	6.2	3.2	.....	5.6	2.5	3.8	2.5	7.5
8	6.1	3.8	12.4	5.8	6.1	3.1	4.3	5.1	.....	3.7	2.4	.....
9	5.8	3.7	11.3	5.3	7.0	.....	4.2	4.7	4.1	4.7	2.4	6.6
10	5.3	.....	9.0	5.5	7.7	2.8	3.6	9.9	4.5	4.4	.....	9.0
11	4.7	3.8	7.3	5.4	7.8	2.7	2.8	.....	3.0	3.0	2.6	9.5
12	4.4	3.7	6.2	5.3	.....	3.4	2.7	9.5	2.8	2.8	2.6	8.4
13	4.1	3.9	5.4	5.4	7.7	3.0	2.5	6.7	2.7	.....	2.8	10.8
14	4.0	4.8	6.4	.....	7.7	3.1	.....	12.8	2.5	2.5	2.7	13.1
15	3.8	4.4	7.3	4.2	13.6	2.9	4.4	12.2	.....	2.4	2.7	.....
16	3.8	4.0	7.6	3.7	12.7	.....	3.7	9.2	2.4	2.4	2.6	12.4
17	3.7	.....	.....	3.6	12.8	2.8	5.4	5.8	2.4	2.3	.....	11.3
18	3.7	3.8	7.8	4.0	11.7	2.7	5.4	.....	2.3	2.2	3.0	10.8
19	3.6	3.7	7.9	5.9	.....	2.7	5.3	4.0	2.2	2.2	2.9	10.5
20	3.8	3.8	8.0	7.6	10.3	2.6	3.9	3.6	2.4	.....	2.8	10.7
21	4.0	3.6	8.2	.....	9.8	2.6	.....	3.3	2.8	2.1	3.5	10.8
22	4.1	.....	7.8	12.4	9.1	2.5	3.0	3.2	.....	2.1	5.8	.....
23	4.3	3.6	6.8	14.3	6.4	.....	2.7	3.1	5.6	2.0	10.0	18.4
24	4.0	.....	.....	14.6	10.4	2.4	2.5	3.3	4.1	2.2	.....	19.3
25	3.8	4.3	4.7	13.6	5.4	2.3	2.4	.....	3.6	2.2	8.7	19.9
26	3.6	4.8	4.3	11.4	.....	2.3	3.9	3.1	3.2	2.1	8.5	18.0
27	3.9	5.6	4.0	10.0	5.3	2.4	3.6	2.6	2.8	.....	8.2	16.0
28	4.1	5.4	3.8	.....	6.9	2.5	.....	2.6	4.6	2.3	.....	16.6
29	4.0	.....	3.5	9.9	6.2	2.4	3.8	2.8	.....	2.2	11.8	.....
30	4.0	.....	3.4	9.2	.....	.....	5.1	2.5	5.7	2.1	11.7	23.4
31	4.4	.....	.....	.....	5.0	.....	5.7	2.8	.....	2.1	.....	25.1
1908.												
1	.....	20.5	.....	15.0	22.1	4.4	2.8	3.4	2.1	2.2	.....	2.2
2	22.2	.....	8.2	12.0	23.2	4.7	2.8	.....	2.0	2.2	2.5	2.2
3	23.3	20.8	7.8	9.7	.....	4.1	2.8	3.5	2.0	2.1	2.5	2.3
4	22.9	19.9	7.5	8.6	16.1	4.1	.....	3.4	2.2	.....	3.1	2.3
5	.....	23.7	6.9	.....	11.4	4.0	.....	3.0	2.2	1.7	3.6	2.3
6	.....	24.9	6.5	7.2	14.4	3.9	3.5	3.0	.....	1.6	3.9	.....
7	19.1	21.8	6.4	6.8	13.6	.....	4.7	2.8	.....	1.8	3.5	2.3
8	18.0	17.1	.....	7.0	12.6	4.2	4.2	3.2	2.5	1.7	.....	2.3
9	17.6	.....	6.0	7.2	11.1	4.2	4.1	.....	2.5	1.7	2.8	2.3
10	15.9	12.7	5.8	7.1	.....	4.0	4.0	2.9	2.4	1.9	2.6	2.2
11	15.8	12.2	5.7	6.5	9.2	3.8	4.1	2.9	2.8	.....	2.7	2.2
12	.....	11.1	5.7	.....	8.8	4.4	.....	2.9	2.7	2.1	2.5	2.7
13	17.4	10.3	5.5	6.0	8.2	3.7	4.0	2.7	.....	2.3	2.4	.....
14	16.5	9.6	5.4	5.9	7.8	.....	3.6	2.4	2.2	2.1	2.4	2.8
15	14.4	11.5	.....	6.1	6.7	3.4	3.6	2.4	1.9	2.0	.....	2.9
16	12.6	.....	5.1	9.4	6.0	3.3	3.2	.....	1.9	1.9	2.3	2.7
17	11.6	11.4	5.1	7.5	.....	3.1	3.8	2.3	1.9	1.9	2.3	2.6
18	11.0	10.9	5.0	7.3	5.2	3.0	2.7	2.2	1.7	.....	2.3	2.5
19	.....	14.7	4.9	.....	5.9	3.1	.....	1.9	1.8	1.8	2.3	2.5
20	9.4	14.3	4.8	7.1	6.1	3.3	2.4	2.0	.....	1.8	2.2	.....
21	8.7	14.8	4.7	7.0	6.2	.....	3.6	1.9	2.0	1.8	2.2	2.5
22	8.3	.....	.....	8.3	6.4	3.5	3.5	2.0	2.5	1.8	.....	3.1
23	8.1	.....	14.3	7.8	6.0	3.5	3.0	.....	2.8	1.7	2.3	2.9
24	7.7	11.5	22.4	8.0	.....	3.6	4.2	2.7	3.5	1.7	2.3	3.0
25	7.3	10.9	26.1	14.1	4.7	7.0	3.6	2.5	2.8	.....	2.2	3.2
26	.....	12.5	28.2	.....	4.5	3.7	.....	2.5	2.4	1.7	.....	3.0
27	7.0	11.6	29.6	16.8	4.6	3.9	4.1	2.6	.....	1.7	2.2	.....
28	6.8	10.3	31.9	18.9	4.2	.....	4.6	2.7	2.3	2.1	2.2	2.8
29	6.6	9.2	.....	18.8	4.5	3.1	5.3	2.6	2.2	2.1	.....	2.6
30	6.4	.....	25.1	21.7	.....	2.9	4.1	.....	2.2	2.1	2.2	2.6
31	7.3	.....	19.0	.....	.....	.....	3.6	2.3	.....	2.5	.....	3.1

Rating table for Conecuh River at Beck, Ala., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	300	3.50	920	5.80	2,030	15.00	7,090
1.70	325	3.60	960	6.00	2,140	16.00	7,640
1.80	350	3.70	1,000	6.20	2,250	17.00	8,190
1.90	375	3.80	1,045	6.40	2,360	18.00	8,740
2.00	400	3.90	1,090	6.60	2,470	19.00	9,290
2.10	430	4.00	1,135	6.80	2,580	20.00	9,840
2.20	460	4.10	1,180	7.00	2,690	21.00	10,390
2.30	490	4.20	1,225	7.20	2,800	22.00	10,940
2.40	520	4.30	1,270	7.40	2,910	23.00	11,490
2.50	550	4.40	1,320	7.60	3,020	24.00	12,040
2.60	585	4.50	1,370	7.80	3,130	25.00	12,590
2.70	620	4.60	1,420	8.00	3,240	26.00	13,140
2.80	655	4.70	1,470	9.00	3,790	27.00	13,690
2.90	690	4.80	1,520	10.00	4,340	28.00	14,240
3.00	725	4.90	1,570	11.00	4,890	29.00	14,790
3.10	760	5.00	1,620	12.00	5,440	30.00	15,340
3.20	800	5.20	1,720	13.00	5,990	31.00	15,890
3.30	840	5.40	1,820	14.00	6,540	32.00	16,440
3.40	880	5.60	1,920				

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 18 discharge measurements made during 1904–1908 and is well defined between gage heights 1.2 feet and 16 feet. Above gage height 5.6 feet the rating curve is a tangent, the difference being 55 per tenth.

Monthly discharge of Conecuh River at Beck, Ala., for 1907 and 1908.

[Drainage area, 1,290 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	3,020	960	1,540	1.19	1.37	A.
February	1,920	960	1,200	.930	.97	A.
March	5,720	880	3,120	2.42	2.79	A.
April	6,870	920	2,880	2.23	2.49	A.
May	6,320	1,620	3,290	2.55	2.94	A.
June	1,570	490	738	.572	.64	A.
July	1,980	520	1,100	.853	.98	A.
August	5,880	550	1,850	1.43	1.65	A.
September	1,980	460	871	.675	.75	A.
October	1,620	400	703	.545	.63	A.
November	5,330	430	1,620	1.26	1.41	A.
December	12,600	2,470	5,920	4.59	5.29	A.
The year	12,600	400	2,070	1.60	21.91	
1908.						
January	11,800	2,360	6,310	4.89	5.64	A.
February	12,500	3,900	6,830	5.29	5.70	A.
March	16,400	1,470	5,270	4.09	4.72	A.
April	10,800	2,080	4,240	3.29	3.67	A.
May	11,600	1,220	3,810	2.95	3.40	A.
June	2,690	690	1,070	.829	.92	A.
July	1,770	520	993	.770	.89	A.
August	920	375	613	.475	.55	A.
September	920	325	495	.384	.43	A.
October	550	300	383	.297	.34	B.
November	1,090	460	574	.445	.50	A.
December	800	460	589	.457	.53	A.
The year	16,400	300	2,600	2.01	27.29	

NOTE.—Discharge is interpolated for days when the gage height was not recorded.

MOBILE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The Mobile River system drains about two-thirds of the State of Alabama and large areas in Georgia and Mississippi. Its basin is triangular in shape and is nearly 300 miles wide near the headwaters in Georgia, Alabama, and Mississippi. It is designated the Mobile basin because its waters enter the Gulf of Mexico through Mobile River, which is formed by the union of Alabama and Tombigbee rivers at a point near the coast.

The main stream of Alabama River branch has many names. Beginning at the headwaters it is Cartecay River, which with Ellijay River makes the Coosawattee. This with Connasauga River forms Oostanaula River, and at Rome, Ga., the Oostanaula and the Etowah rivers unite to form Coosa River. Six miles above Montgomery, Ala., Tallapoosa River joins the Coosa and forms Alabama River. Cahaba River is a tributary of the Alabama and joins it about 10 miles below Selma. Hillabee Creek flows into Tallapoosa River just above Sturdevant. Talladega and Choccolocco creeks are tributaries of the Coosa.

Tombigbee River rises in the northeastern part of Mississippi and enters Alabama in Pickens County. Its principal tributary is the Black Warrior, which is formed by the junction of Mulberry Fork and Sipsey Fork. Locust Fork enters the Black Warrior some distance below the junction.

The mean annual rainfall is about 50 inches.

Coosa and Tallapoosa rivers and their tributaries are important water-power streams, and offer many exceptionally good locations for development.

The following gaging stations have been maintained in this river basin:[a]

Cartecay River, Cartecay, Ga., 1904, 1905, 1907.
Coosawattee River, Carters, Ga., 1896–1908.
Oostanaula River, Resaca, Ga., 1896–1908.
Coosa River, Rome, Ga., 1897–1903.
Coosa River, Lock No. 4, Ala., above Riverside, Ala., 1890–1901.
Coosa River, Riverside, Ala., 1896–1908.
Coosa River, Lock No. 5, near Childersburg, Ala., 1892–1897.
Coosa River, Wetumpka, Ala., 1896–1898.
Alabama River, Montgomery, Ala., 1899–1903.
Alabama River, Selma, Ala., 1900–1908.
Ellijay River, Ellijay, Ga., 1907.

[a] Data collected in this drainage basin in Alabama prior to 1904 have been compiled in Water powers of Alabama: Water-Supply Paper U. S. Geol. Survey No. 107. Data collected in this drainage basin in Georgia prior to 1906 have been compiled in Water resources of Georgia: Water-Supply Paper U. S. Geol. Survey No. 197.

Conasauga River, Beaverdale, Ga., 1907–8.
Etowah River, Ball Ground, Ga., 1907–8.
Etowah River, Canton, Ga., 1892–1905.
Etowah River near Rome, Ga., 1904–1908.
Etowah River at Rome, Ga., 1903.
Amicalola River, Potts Mountain, Ga., 1907–8.
Choccolocco Creek, Jenifer, Ala., 1903–1908.
Tallapoosa River, Sturdevant, Ala., 1900–1908.
Talladega Creek, Nottingham, Ala., 1900–1904.
Tallapoosa River, Susanna, Ala., 1900–1901.
Tallapoosa River, Milstead, Ala., 1897–1903.
Hillabee Creek, Alexander City, Ala., 1900–1903.
Big Sandy Creek, Dadeville, Ala., 1900–1901.
Cahaba River, Centerville, Ala., 1901–1908.
Tombigbee River, Columbus, Miss., 1900–1908.
Tombigbee River, Epes, Ala., 1900–1908.
Black Warrior River, Cordova, Ala., 1900–1908.
Black Warrior River, Coal, Ala., 1908.
Black Warrior River, Tuscaloosa, Ala., 1889–1905.
Clear Creek, Elk, Ala., 1904–5.
Locust Fork, Black Warrior River, Palos, Ala., 1901–1905.

CARTECAY RIVER NEAR CARTECAY, GA.

The station is located at a wooden bridge about 1½ miles from Cartecay, 6 miles from Ellijay, Ga., and about 1 mile below the mouth of Licklog Creek. It was originally established June 27, 1904, and was discontinued December 31, 1905. It was reestablished May 4, 1907, and was again discontinued November 2, 1907.

The datum of the vertical staff gage, which is attached to the bridge from which discharge measurements are made, has remained the same since the establishment of the station. Conditions of flow are somewhat changeable. A fair rating has been developed for low stages.[a]

Discharge measurements of Cartecay River near Cartecay, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 4	M. R. Hall	57	85	1.63	234
August 6	F. P. Thomas	58	80	1.30	159
Do	do	58	83	1.32	168
November 15	M. R. Hall	56	59	1.02	133

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Cartecay River near Cartecay, Ga., for 1907.

[Observer, Jesse Holden.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	.....	.....	.....	.....	4.10	1.30	1.40	0.92	1.50	1.35
2	.....	.....	.....	.....	.....	1.95	1.40	1.30	.88	1.05	1.25
3	.....	.....	.....	.....	.....	1.75	1.35	1.30	1.40	1.15	.....
4	.....	.....	.....	.....	1.63	1.75	1.30	1.20	1.45	1.10	.....
5	.....	.....	.....	.....	1.60	1.65	1.30	1.15	1.30	1.10	.....
6	.....	.....	.....	.....	1.60	1.55	1.25	1.31	1.10	1.25	.....
7	.....	.....	.....	.....	1.90	1.50	1.20	1.10	.92	1.00	.....
8	.....	.....	.....	.....	1.65	2.65	1.20	1.00	.90	1.25	.....
9	.....	.....	.....	.....	1.55	1.80	1.20	.98	.98	1.00	.....
10	.....	.....	.....	.....	1.40	1.55	1.35	.92	1.15	1.00	.....
11	.....	.....	.....	.....	1.35	1.50	1.40	.98	1.35	1.00	.....
12	.....	.....	.....	.....	1.35	1.50	1.80	1.60	1.20	.92	.....
13	.....	.....	.....	.....	1.30	1.60	1.80	1.70	1.05	.90	.....
14	.....	.....	.....	.....	1.35	1.65	1.70	2.40	.95	.85	.....
15	.....	.....	.....	.....	1.95	1.40	1.60	2.35	.92	.80	.....
16	.....	.....	.....	.....	1.70	1.40	1.50	2.00	.90	.80	.....
17	.....	.....	.....	.....	1.40	1.40	1.45	1.45	.82	.80	.....
18	.....	.....	.....	.....	1.40	1.40	1.40	1.25	.80	.80	.....
19	.....	.....	.....	.....	1.30	1.70	1.50	1.35	.80	.80	.....
20	.....	.....	.....	.....	1.30	1.50	1.50	1.30	.80	1.00	.....
21	.....	.....	.....	.....	1.30	1.45	1.30	1.20	.80	1.00	.....
22	.....	.....	.....	.....	1.30	1.60	1.20	1.35	1.25	1.05	.....
23	.....	.....	.....	.....	1.30	1.65	1.20	1.20	2.40	.90	.....
24	.....	.....	.....	.....	1.50	2.20	1.15	1.20	1.10	1.00	.....
25	.....	.....	.....	.....	1.40	1.70	1.50	1.30	.90	1.00	.....
26	.....	.....	.....	.....	2.40	1.40	1.60	1.20	.88	1.00	.....
27	.....	.....	.....	.....	1.55	1.40	1.50	1.10	.80	1.20	.....
28	.....	.....	.....	.....	1.40	1.40	1.60	1.05	2.65	1.20	.....
29	.....	.....	.....	.....	1.40	1.30	1.40	1.05	1.65	1.10	.....
30	.....	.....	.....	.....	1.40	1.30	1.70	1.00	1.25	1.25	.....
31	.....	.....	.....	.....	2.70	.....	1.50	1.00	.....	1.20	.....

Daily discharge, in second-feet, of Cartecay River near Cartecay, Ga., for 1907.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	.....	.....	174	195	103	218	184	17	195	195	206	206	87	84	.....
2	.....	336	195	174	97	126	164	18	195	195	195	164	84	84	.....
3	.....	280	184	174	195	144	.....	19	174	267	218	184	84	84	.....
4	250	280	174	154	206	135	.....	20	174	218	218	174	84	117	.....
5	242	254	174	144	174	135	.....	21	174	206	174	154	84	117	.....
6	242	230	164	176	135	164	.....	22	174	242	154	184	164	126	.....
7	321	218	154	135	103	117	.....	23	174	254	154	154	.....	100	.....
8	254	.....	154	117	100	164	.....	24	218	.....	144	154	135	117	.....
9	230	293	154	114	114	117	.....	25	195	267	218	174	100	117	.....
10	195	230	184	103	144	117	.....	26	.....	195	242	154	97	117	.....
11	184	218	195	114	184	117	.....	27	230	195	218	135	84	154	.....
12	184	218	293	242	154	103	.....	28	195	195	242	126	.....	154	.....
13	174	242	293	267	126	100	.....	29	195	174	195	126	254	135	.....
14	184	254	267	.....	108	92	.....	30	195	174	267	117	164	164	.....
15	336	195	242	.....	103	84	.....	31	.....	.....	218	117	.....	154	.....
16	267	195	218	350	100	84	.....								

NOTE.—Daily discharge based on a fairly well defined rating curve. On missing days from May 4 to November 2 the discharge was greater than 380 second-feet.

COOSAWATTEE RIVER AT CARTERS, GA.

The station is located at the iron highway bridge at Carters, Murray County, Ga., one-half mile below the mouth of Talking Rock Creek. It was established August 15, 1896, and with the exception of a short period from August 26 to November 3, 1900, the record is continuous to December 31, 1908, when the station was discontinued.

The datum of the gage has remained the same since the establishment of the station. Both banks are fairly high, but overflow at flood stages. Conditions of flow are changeable. A fair rating has been developed for low and medium stages for 1907 and 1908.[a]

Discharge measurements of Coosawattee River at Carters, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907.					
April 29	M. R. Hall and O. P. Hall	107	423	2.80	1,120
July 18	M. R. Hall	105	313	1.94	652
1908.					
July 13	M. R. Hall	110	307	1.95	697
December 11	do	111	326	2.08	691

Daily gage height, in feet, of Coosawattee River at Carters, Ga., for 1907 and 1908.

[Observer, Robert P. Messer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.0	5.0	4.6	2.8	2.7	8.0	2.9	1.65	1.2	2.9	1.4	2.5
2	4.5	6.5	10.5	2.8	2.7	4.2	2.65	1.9	1.2	2.45	1.9	2.5
3	4.0	5.0	6.0	2.7	3.35	2.75	2.4	1.55	1.35	2.35	1.75	2.4
4	3.6	4.0	5.0	2.7	2.9	2.25	2.3	1.45	1.75	2.25	1.7	2.25
5	3.6	6.0	5.5	2.7	2.75	1.95	2.25	1.4	1.55	1.95	1.7	2.15
6	3.5	9.0	4.8	2.8	2.85	1.85	2.2	1.3	1.45	1.75	1.8	2.0
7	3.5	6.0	4.7	2.8	4.4	1.8	2.1	1.4	1.4	1.6	1.7	2.0
8	3.4	5.0	4.6	2.9	3.15	3.25	2.1	1.4	1.55	1.6	1.7	1.9
9	3.3	4.5	4.5	2.9	3.45	2.9	2.0	1.3	1.45	1.6	1.95	2.1
10	3.3	4.0	4.5	2.8	3.05	2.8	2.15	1.3	1.4	1.6	3.0	3.75
11	3.1	3.5	4.5	2.8	3.6	2.7	2.3	1.3	1.5	1.55	2.5	3.2
12	3.0	3.3	4.4	2.7	2.9	2.6	3.5	1.2	1.45	1.5	1.95	3.15
13	3.0	3.2	4.0	2.7	2.9	2.5	2.75	2.15	1.4	1.5	1.75	3.0
14	2.9	3.1	3.8	2.8	2.8	2.5	2.3	2.0	1.4	1.5	1.7	2.95
15	2.8	3.1	3.8	2.8	5.5	2.5	2.2	1.9	1.35	1.5	1.7	2.8
16	2.8	3.0	3.7	2.7	3.75	2.4	2.1	1.75	1.3	1.5	1.6	2.8
17	2.8	3.0	3.7	2.7	3.1	2.4	2.0	1.5	1.3	1.45	1.6	3.1
18	2.7	3.0	3.6	2.7	3.0	2.4	2.0	2.05	1.3	1.4	1.85	2.9
19	2.7	3.0	3.6	2.7	2.9	2.55	1.9	1.95	1.3	1.4	2.05	2.85
20	4.0	2.9	3.5	2.8	2.75	2.5	1.85	1.9	1.2	1.4	1.8	2.75
21	3.0	2.9	3.4	2.8	2.55	2.4	2.05	1.65	1.2	1.4	1.8	2.7
22	2.8	2.9	3.3	2.9	2.5	2.4	1.85	1.6	4.0	1.4	2.9	3.1
23	2.7	3.0	3.1	4.6	2.5	2.35	1.8	2.05	10.4	1.4	5.8	4.7
24	2.7	3.5	3.0	4.0	2.45	2.3	2.0	1.95	2.85	1.6	8.7	2.95
25	2.8	3.7	2.9	3.5	2.4	3.5	1.95	2.65	1.95	1.5	5.0	2.85
26	3.0	3.9	2.8	3.2	5.0	2.5	1.85	2.35	1.7	1.45	2.7	2.7
27	2.8	4.8	2.8	3.0	3.75	2.4	1.8	2.7	1.5	1.4	2.6	2.85
28	2.8	4.0	2.7	2.8	2.65	2.3	1.8	1.85	2.25	1.4	2.55	3.0
29	2.7	.....	2.7	2.8	2.0	2.2	1.8	1.75	6.0	1.4	2.5	10.7
30	2.7	.....	2.7	2.7	1.95	2.2	1.95	1.4	3.25	1.4	2.5	7.2
31	2.8	.....	2.8	.....	4.2	.....	1.85	1.4	.....	1.4	.....	4.2

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Coosawattee River at Carters, Ga., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	3.9	4.2	3.15	3.3	3.65	2.85	1.6	1.2	3.8	1.0	1.8	1.7
2	3.7	2.95	3.25	3.25	3.45	2.75	1.75	1.2	1.25	1.0	1.8	2.0
3	3.9	2.8	3.25	3.15	3.4	2.65	1.8	1.35	1.2	.95	1.75	1.8
4	4.5	2.8	3.15	3.1	3.4	2.85	1.7	1.2	1.2	.95	2.4	1.6
5	6.8	3.25	3.1	3.35	3.7	3.05	1.95	1.3	3.0	.95	2.2	1.45
6	3.5	2.9	3.0	3.95	3.95	2.85	1.75	1.55	3.8	.95	2.0	2.7
7	2.9	2.8	3.0	3.7	5.8	2.65	1.7	1.3	2.6	.95	1.9	14.7
8	2.75	2.8	3.0	3.7	3.95	2.55	1.9	1.7	2.05	.9	1.85	5.0
9	2.65	2.95	2.9	3.55	3.75	2.45	2.1	2.35	2.0	1.75	1.65	2.75
10	2.6	6.7	2.9	3.45	3.45	2.35	3.55	1.85	1.9	2.2	1.55	2.35
11	4.2	4.8	3.0	3.4	3.35	2.3	3.3	1.55	1.85	2.05	1.35	2.15
12	6.2	4.0	3.15	3.3	3.3	2.2	3.2	1.4	1.8	1.55	1.3	2.5
13	5.0	4.6	3.15	3.2	3.2	2.5	3.3	1.4	1.65	1.35	1.2	2.35
14	4.2	4.0	3.05	3.2	3.05	2.7	3.15	1.3	1.45	1.2	1.2	2.15
15	3.9	14.0	3.0	3.95	2.75	2.4	3.05	1.3	1.35	1.1	1.15	1.65
16	3.75	5.5	2.9	5.2	2.6	2.2	2.95	1.3	1.3	1.1	1.6	1.4
17	3.6	3.75	2.8	4.4	2.5	2.15	2.75	1.45	1.2	1.05	1.45	2.25
18	3.35	3.45	2.8	6.2	2.85	2.1	2.55	1.8	1.1	1.05	1.25	2.35
19	3.25	3.4	2.7	4.9	3.05	2.05	2.3	1.45	1.1	1.0	1.2	2.2
20	3.15	3.9	2.7	4.0	2.75	1.95	2.05	1.4	1.1	1.0	1.1	2.9
21	3.0	3.55	2.85	3.9	2.65	1.85	1.85	1.4	1.1	1.0	1.1	2.55
22	2.75	3.45	3.65	3.75	2.55	1.8	1.65	4.6	1.1	.95	1.05	2.3
23	2.7	3.4	12.3	3.55	2.45	1.8	1.45	2.55	1.05	1.1	1.0	2.0
24	2.6	3.4	11.8	3.35	2.4	1.95	1.4	2.5	1.05	1.05	1.05	1.85
25	2.6	3.3	6.2	4.8	2.3	1.85	1.4	3.3	1.0	1.0	1.1	1.8
26	2.65	4.4	5.2	4.0	2.45	1.75	1.4	2.15	1.0	1.0	1.1	1.7
27	2.85	3.9	4.6	3.7	3.35	1.7	1.35	1.7	1.0	1.15	1.6	1.65
28	2.75	3.5	4.0	3.5	3.2	1.7	1.35	1.65	1.15	1.4	1.5	1.6
29	2.7	3.25	3.75	3.4	3.15	1.6	1.3	1.55	1.05	2.4	1.4	1.5
30	2.7	.....	3.55	3.85	3.05	1.6	1.3	1.5	1.0	2.1	1.4	1.85
31	3.25	.....	3.4	.....	3.0	.....	1.25	1.35	.....	1.95	.....	1.65

Rating table for Coosawattee River at Carters, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	260	2.30	840	3.70	1,675	6.20	3,410
1.00	290	2.40	890	3.80	1,740	6.40	3,560
1.10	320	2.50	940	3.90	1,805	6.60	3,700
1.20	350	2.60	1,000	4.00	1,870	6.80	3,850
1.30	390	2.70	1,060	4.20	2,000	7.00	3,990
1.40	430	2.80	1,120	4.40	2,130	8.00	4,710
1.50	470	2.90	1,180	4.60	2,270	9.00	5,430
1.60	510	3.00	1,240	4.80	2,410	10.00	6,150
1.70	550	3.10	1,300	5.00	2,550	11.00	6,870
1.80	590	3.20	1,360	5.20	2,690	12.00	7,590
1.90	640	3.30	1,420	5.40	2,840	13.00	8,310
2.00	690	3.40	1,480	5.60	2,980	14.00	9,030
2.10	740	3.50	1,545	5.80	3,130	15.00	9,750
2.20	790	3.60	1,610	6.00	3,270		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on four discharge measurements made during 1907 and 1908 and measurements made prior to these years above gage height 3 feet. It is fairly well defined below gage height 8 feet. Above gage height 5 feet the rating curve is a tangent, the difference being 72 per tenth.

Monthly discharge of Coosawattee River at Carters, Ga., for 1907 and 1908.

[Drainage area, 531 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	3,990	1,060	1,400	2.64	3.04
February	5,430	1,180	1,970	3.71	3.86
March	6,510	1,060	1,930	3.63	4.18
April	2,270	1,060	1,200	2.26	2.52
May	2,910	665	1,320	2.49	2.87
June	4,710	590	1,100	2.07	2.31
July	1,540	590	771	1.45	1.67
August	1,060	350	577	1.09	1.26
September	6,440	350	850	1.60	1.78
October	1,180	430	532	1.00	1.15
November	5,210	430	1,000	1.88	2.10
December	6,650	640	1,430	2.69	3.10
The year	6,650	350	1,170	2.21	29.84
1908.					
January	3,850	1,000	1,570	2.96	3.41
February	9,030	1,120	1,950	3.67	3.96
March	7,810	1,060	1,870	3.52	4.06
April	3,410	1,300	1,750	3.30	3.68
May	3,130	840	1,360	2.56	2.95
June	1,270	510	819	1.54	1.72
July	1,580	370	756	1.42	1.64
August	2,270	350	595	1.12	1.29
September	1,740	290	539	1.02	1.14
October	890	275	394	.742	.86
November	890	290	464	.874	.98
December	9,530	430	1,060	2.00	2.31
The year	9,530	275	1,090	2.06	28.00

NOTE.—Owing to poor gage readings during much of the above period the values for the monthly means can not be classed as better than C and for some short periods may be much poorer.

OOSTANAULA RIVER AT RESACA, GA.

The station is located at the bridge of the Western and Atlantic Railroad in the town of Resaca, 800 feet south of the depot. It is 3 miles below the junction of the Conasauga and Coosawattee rivers. The station, which was originally established August 1, 1896, has been jointly maintained by the United States Weather Bureau and United States Geological Survey. From 1899 to 1904 only partial records of gage height were obtained.

There has been no change in the datum of the gage since the establishment of the station. The left bank is low and overflows during high water for 480 feet. Conditions of flow at this station are practically permanent and a good rating has been developed for low and medium stages.[a]

Discharge measurements of Oostanaula River at Resaca, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 20	M. R. Hall	142	894	3.37	1,330
November 5	Warren E. Hall	138	866	2.69	1,030
1908.					
December 12	M. R. Hall	159	1,120	4.49	2,160

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Oostanaula River, at Resaca, Ga., for 1907 and 1908.

[Observer, Duncan A. Norton.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	16.4	5.0	10.8	5.0	4.6	9.6	4.4	3.2	2.0	6.0	2.6	4.0
2	13.6	15.5	15.6	5.8	4.4	9.0	4.8	3.0	2.0	4.4	2.4	3.8
3	10.4	14.4	18.0	4.4	4.2	5.4	4.4	3.0	2.2	3.6	3.6	3.4
4	7.8	14.6	14.4	4.2	5.0	5.6	4.2	2.8	3.6	3.6	3.4	3.4
5	6.8	13.8	9.4	4.2	5.8	5.4	4.2	2.8	3.4	3.4	3.0	3.2
6	6.6	13.0	8.6	5.4	6.4	5.0	3.8	2.8	2.6	3.6	3.0	3.4
7	5.2	9.6	5.8	7.0	6.2	4.8	3.6	2.8	2.4	3.6	2.8	3.4
8	4.4	7.6	7.2	5.8	9.0	4.6	3.6	2.8	2.0	3.3	2.8	3.4
9	4.2	7.0	6.7	5.4	7.0	9.0	3.4	2.8	2.0	3.6	2.6	3.4
10	4.2	6.4	6.0	5.2	5.6	10.0	3.4	3.0	2.2	3.2	2.6	5.0
11	4.0	6.0	5.2	5.0	5.6	8.8	3.4	2.8	2.0	3.0	5.8	4.4
12	4.0	5.8	4.8	4.8	6.8	6.4	3.8	2.8	2.8	2.8	5.0	4.2
13	4.0	5.6	4.4	5.0	6.2	4.8	5.0	3.6	2.6	2.8	3.8	4.0
14	4.0	5.4	4.4	4.8	5.2	5.2	7.8	3.0	2.2	2.6	3.6	6.6
15	4.0	5.2	4.6	4.8	8.2	4.8	6.8	4.8	2.2	2.4	3.4	8.6
16	4.0	5.2	7.4	4.4	12.2	4.6	4.6	3.4	2.2	2.4	3.2	7.4
17	3.9	5.0	6.4	4.6	9.2	4.4	4.4	2.8	2.1	2.4	3.0	6.0
18	3.8	5.0	5.7	4.8	6.4	4.4	4.0	3.0	2.1	2.4	3.2	5.6
19	3.8	4.8	5.5	4.6	5.6	4.0	3.8	4.0	2.1	2.4	4.2	5.0
20	5.0	5.0	5.4	5.0	5.4	3.8	3.4	2.8	2.0	2.4	3.9	4.6
21	5.8	5.2	5.2	4.8	4.8	3.8	3.6	2.8	2.0	2.4	5.4	4.4
22	5.2	5.0	5.2	4.6	4.6	3.8	3.6	2.6	2.0	2.2	5.6	4.2
23	5.0	4.8	5.0	4.6	4.4	3.6	3.2	2.4	11.2	2.2	10.4	5.6
24	4.8	4.6	4.8	9.2	4.8	4.6	3.0	2.6	14.8	2.2	15.6	9.2
25	4.8	7.7	4.8	8.2	5.2	5.2	3.0	4.6	6.0	2.2	14.6	9.6
26	4.6	7.6	4.6	6.0	4.6	6.0	3.0	3.6	3.8	2.2	12.0	8.4
27	5.0	11.0	4.6	5.4	6.4	5.0	3.0	2.8	3.4	2.4	7.2	7.4
28	4.5	10.2	4.4	4.0	4.8	5.0	3.4	2.6	3.6	3.6	5.6	7.0
29	3.9	.....	4.4	5.0	4.6	7.6	3.6	2.4	11.2	3.4	4.8	7.3
30	3.6	.....	4.2	4.8	4.6	5.6	4.2	2.4	9.2	3.0	4.2	7.8
31	3.4	.....	4.3	.....	5.6	.....	3.6	2.2	.....	2.8	.....	14.4
1908.												
1	11.5	9.4	5.3	6.0	5.6	4.0	2.4	2.0	2.0	1.8	2.0	2.0
2	8.4	10.2	5.2	5.8	5.4	3.8	2.2	1.8	1.8	1.8	2.0	4.2
3	6.4	8.2	5.2	5.6	5.0	3.8	2.2	1.6	1.6	1.7	2.0	3.8
4	4.7	6.0	5.1	5.4	5.0	3.8	2.2	1.6	1.5	1.7	2.2	2.8
5	11.2	5.8	5.0	5.2	5.0	3.6	6.8	1.6	1.5	1.7	2.4	2.4
6	14.4	6.0	5.0	6.6	5.6	5.4	6.6	3.0	8.2	1.6	2.2	2.4
7	10.8	5.6	5.0	8.0	6.6	5.4	5.6	3.6	5.6	1.6	2.0	14.0
8	8.2	5.4	5.0	6.0	9.4	5.0	5.0	2.8	3.4	1.6	1.8	20.0
9	5.6	5.7	4.9	5.6	6.8	4.8	4.4	4.8	2.8	1.8	1.8	16.7
10	4.8	8.8	4.8	5.4	6.4	4.2	5.6	4.4	2.0	3.2	1.7	10.0
11	4.2	16.2	4.8	5.2	6.0	4.4	5.2	4.0	1.8	5.4	1.8	5.0
12	9.4	15.0	5.4	5.0	5.4	4.4	4.4	3.4	1.8	2.8	1.6	3.6
13	11.2	11.4	6.2	4.6	5.2	3.6	4.0	3.4	1.6	2.8	1.6	4.6
14	7.6	10.8	6.4	4.4	5.0	3.4	3.8	2.8	1.6	2.6	1.6	4.2
15	5.7	17.0	5.8	6.0	4.8	3.4	3.6	2.3	1.5	2.4	2.0	4.0
16	4.8	20.0	5.4	10.0	4.4	3.2	3.4	1.8	1.5	2.2	2.0	3.8
17	5.8	18.0	5.2	7.6	4.4	3.2	3.0	1.6	1.4	2.2	2.0	3.6
18	5.4	15.6	5.0	6.6	4.4	3.2	2.8	1.6	1.4	1.8	1.8	3.6
19	5.2	9.8	4.8	12.6	4.6	3.0	2.4	3.4	1.3	1.8	1.8	3.4
20	5.0	8.6	5.4	11.2	5.4	3.0	2.2	2.6	1.2	1.6	1.8	3.2
21	4.6	7.0	10.4	8.6	5.0	3.0	2.0	2.0	1.2	1.6	1.8	3.3
22	5.8	6.2	8.6	6.0	4.8	3.0	2.0	2.6	1.2	1.4	1.8	6.7
23	5.4	6.2	7.6	5.4	4.6	3.4	2.0	6.4	1.1	1.4	1.8	13.4
24	4.8	5.8	17.4	5.4	4.4	2.8	1.8	4.4	1.1	1.6	1.8	9.0
25	4.4	5.8	19.8	7.8	4.4	2.6	1.8	6.4	1.1	1.6	1.6	7.4
26	4.4	8.2	16.8	9.8	6.0	2.6	1.8	6.0	1.1	1.6	1.6	5.4
27	5.2	8.6	10.4	8.6	5.4	2.6	1.6	3.6	1.6	1.6	1.6	4.4
28	5.8	7.4	7.4	6.4	5.0	2.6	1.6	3.2	1.7	1.6	1.6	4.2
29	6.0	5.5	6.8	5.8	4.8	2.6	1.6	2.8	1.7	1.6	1.6	4.0
30	5.8	.....	6.4	5.6	4.6	2.4	1.6	2.4	1.7	2.0	1.6	4.0
31	5.0	.....	6.2	.....	4.4	.....	2.2	2.2	.....	2.0	.....	4.0

Rating table for Oostanaula River at Resaca, Ga., for 1906, 1907, and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.10	310	2.80	1,055	4.50	2,155	7.40	4,650
1.20	340	2.90	1,110	4.60	2,230	7.60	4,850
1.30	371	3.00	1,170	4.70	2,305	7.80	5,050
1.40	404	3.10	1,230	4.80	2,380	8.00	5,250
1.50	439	3.20	1,290	4.90	2,455	9.00	6,280
1.60	476	3.30	1,350	5.00	2,530	10.00	7,420
1.70	515	3.40	1,410	5.20	2,690	11.00	8,640
1.80	556	3.50	1,475	5.40	2,850	12.00	9,930
1.90	599	3.60	1,540	5.60	3,010	13.00	11,280
2.00	644	3.70	1,605	5.80	3,170	14.00	12 680
2.10	691	3.80	1,670	6.00	3,340	15.00	14,120
2.20	740	3.90	1,735	6.20	3,520	16.00	15,600
2.30	790	4.00	1,800	6.40	3,700	17.00	17,100
2.40	840	4.10	1,870	6.60	3,880	18.00	18,600
2.50	890	4.20	1,940	6.80	4,060	19.00	20,100
2.60	945	4.30	2,010	7.00	4,250	20.00	21,600
2.70	1,000	4.40	2,080	7.20	4,450		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 14 discharge measurements made during 1904–1908, and is well defined below gage height 6 feet. Above gage height 16 feet the rating curve is a tangent, the difference being 150 per tenth.

Monthly discharge of Oostanaula River at Resaca, Ga., for 1907 and 1908.

[Drainage area, 1,610 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	16,200	1,410	3,260	2.02	2.33	A.
February	14,900	2,230	5,400	3.35	3.49	A.
March	18,600	1,940	4,410	2.74	3.16	A.
April	6,500	1,800	2,760	1.71	1.91	A.
May	10,200	1,940	3,390	2.11	2.43	A.
June	7,420	1,540	3,200	1.99	2.22	A.
July	5,050	1,170	1,850	1.15	1.33	A.
August	2,380	740	1,190	.739	.85	A.
September	13,800	644	2,120	1.32	1.47	A.
October	3,340	740	1,190	.739	.85	A.
November	15,000	840	3,090	1.92	2.14	A.
December	13,300	1,290	3,390	2.11	2.43	A.
The year	18,600	644	2,940	1.82	24.61	
1908.						
January	13,300	1,940	4,230	2.63	3.03	A.
February	21,600	2,850	7,380	4.58	4.94	B.
March	21,300	2,380	4,930	3.06	3.53	A.
April	10,700	2,080	4,160	2.58	2.88	A.
May	6,720	2,080	2,790	1.73	1.99	A.
June	2,850	840	1,530	.950	1.06	A.
July	4,060	476	1,380	.857	.99	A.
August	3,700	476	1,320	.820	.95	A.
September	5,450	310	751	.466	.52	A.
October	2,850	404	683	.424	.49	A.
November	840	476	573	.356	.40	A.
December	21,600	644	3,970	2.47	2.85	A.
The year	21,600	310	2,810	1.74	23.63	

COOSA RIVER AT RIVERSIDE, ALA.

The station is located at the Southern Railway bridge in the village of Riverside. It is 1 mile above Blue Eye and about 7 miles above Choccolocco Creek. It was established September 25, 1896.

The datum of the gage has remained the same since the establishment of the station. Both banks are high and do not overflow. The bed of the stream is rocky and permanent. A good rating has been developed.[a]

The following discharge measurement was made:

October 28, 1907: Width, 505 feet; area, 3,300 square feet; gage height, 1.29 feet; discharge, 2,890 second-feet.

Daily gage height, in feet, of Coosa River at Riverside, Ala., for 1907 and 1908.

[Observer, S. T. Waits.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	11.7	7.1	9.8	3.1	4.9	7.8	3.25	2.5	1.55	2.65	1.55	4.3
2	12.6	9.3	12.5	3.25	4.4	8.8	3.25	2.35	1.55	3.25	1.6	3.85
3	12.2	10.1	14.0	3.5	4.0	8.8	3.25	2.2	1.5	4.0	1.4	3.45
4	11.4	10.6	14.0	3.6	4.0	7.8	3.0	2.0	2.0	3.1	1.4	3.2
5	10.1	11.5	13.5	3.6	4.0	6.3	2.65	1.9	2.75	2.45	1.45	2.85
6	8.2	11.0	12.8	3.6	4.1	4.9	2.5	1.8	2.2	2.2	1.5	2.65
7	6.0	10.6	11.3	3.75	4.7	4.2	2.35	1.6	1.9	2.0	1.45	2.5
8	5.3	9.8	9.4	4.0	5.2	3.75	2.2	1.55	2.0	2.0	1.4	2.45
9	4.9	8.2	6.7	4.2	5.4	3.45	2.1	2.4	2.15	2.05	1.4	2.4
10	4.6	6.6	6.0	4.2	5.6	3.2	2.05	2.4	2.0	2.05	1.4	3.1
11	4.4	5.8	5.8	3.85	5.8	3.5	2.0	3.0	1.75	2.0	1.4	3.3
12	4.3	5.3	5.4	3.6	5.9	4.0	2.0	3.0	2.0	1.8	1.9	3.7
13	4.2	4.9	4.9	3.3	5.5	4.3	2.0	2.75	2.25	1.75	2.85	4.2
14	4.0	4.8	4.7	3.3	5.0	3.9	2.75	2.6	1.95	1.65	2.35	5.0
15	3.8	4.4	4.7	3.4	7.5	3.35	3.6	2.3	1.8	1.55	2.15	5.3
16	3.65	4.1	4.6	3.4	10.4	3.35	3.4	2.0	1.7	1.45	1.95	5.7
17	3.55	3.95	4.6	3.4	11.0	3.45	3.4	2.9	1.65	1.4	1.9	5.9
18	3.5	3.8	4.5	3.35	10.4	3.0	3.25	2.8	1.5	1.4	1.85	5.4
19	3.45	3.7	4.5	3.6	8.2	2.65	2.9	2.7	1.3	1.35	1.95	4.7
20	3.4	3.6	4.2	3.7	5.4	2.55	2.4	2.6	1.25	1.35	2.1	4.0
21	4.2	3.55	4.0	3.7	5.1	2.45	2.5	2.5	1.2	2.35	2.85	3.75
22	4.2	3.5	3.9	3.65	4.4	2.35	2.65	2.5	1.9	1.35	3.75	3.5
23	4.2	3.5	3.8	4.0	4.0	2.35	2.35	2.45	3.6	1.35	6.1	3.4
24	3.85	3.5	3.7	4.5	3.8	2.35	2.15	2.5	7.0	1.3	8.5	4.3
25	3.55	4.8	3.55	5.8	4.2	2.35	2.0	2.6	7.1	1.3	9.2	5.3
26	3.4	5.7	3.4	6.1	4.6	2.6	1.95	2.7	6.2	1.3	9.3	5.2
27	3.3	6.8	3.35	6.2	5.3	2.8	1.9	2.4	4.4	1.3	8.8	5.1
28	3.25	8.1	3.2	5.9	4.4	2.95	2.2	2.2	3.7	1.3	7.2	5.0
29	3.2	.....	3.1	4.8	4.2	3.3	2.5	1.95	2.9	1.3	5.9	5.1
30	3.2	.....	3.1	4.9	4.1	3.5	2.8	1.75	2.75	1.3	5.1	6.1
31	3.4	.....	3.1	.....	4.9	.....	2.7	1.55	.....	1.5	.....	8.4
1908.												
1	9.6	5.6	6.2	5.6	4.8	3.7	1.75	1.55	1.65	.95	1.15	1.25
2	10.4	7.6	5.6	5.1	4.4	3.3	1.7	1.55	1.55	.95	1.25	1.65
3	10.2	8.4	5.2	4.8	4.2	2.95	1.65	1.5	1.45	.95	1.55	1.95
4	8.5	8.2	6.3	4.5	4.0	2.7	1.7	1.45	1.35	.95	1.65	2.05
5	6.8	7.0	5.9	4.2	3.95	2.45	1.7	1.45	1.25	.95	1.7	2.75
6	7.2	6.15	5.4	4.2	4.6	2.6	1.7	1.45	1.85	.9	1.7	2.95
7	8.0	5.8	5.0	4.2	4.7	2.75	2.1	1.85	2.4	.9	1.6	6.8
8	8.4	5.5	4.8	4.4	4.9	3.1	3.8	2.55	3.9	.9	1.55	10.6
9	7.8	5.4	4.4	4.7	5.0	3.0	4.4	2.7	4.1	1.05	1.45	11.7
10	7.0	5.4	4.1	4.4	5.2	2.9	3.5	2.85	3.05	1.15	1.35	11.8
11	6.1	7.9	4.0	4.1	5.1	2.8	2.85	3.05	2.1	1.85	1.25	11.0
12	6.4	9.7	4.0	3.8	4.2	2.7	3.05	2.95	1.75	2.4	1.2	8.7
13	6.5	11.1	4.0	3.65	3.8	2.6	3.6	2.5	1.6	2.95	1.15	6.7
14	6.5	12.0	4.2	3.5	3.5	2.6	3.1	1.95	1.45	2.25	1.1	4.2
15	6.6	14.3	4.4	3.4	3.45	2.6	2.85	1.7	1.35	1.85	1.1	3.35

[a] Data collected at this station prior to 1904 have been compiled in Water-Supply Paper No. 107, Water powers of Alabama.

Daily gage height, in feet, of Coosa River at Riverside, Ala., for 1907 and 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	6.6	14.6	4.3	4.7	3.45	2.6	2.25	1.55	1.35	1.25	1.1	3.1
17	6.0	14.4	4.2	6.2	3.35	2.5	2.0	1.45	1.35	1.25	1.15	2.8
18	5.6	14.1	4.0	6.6	3.35	2.5	1.9	1.35	1.3	1.25	1.2	2.55
19	5.2	13.9	3.9	6.6	3.7	2.45	1.18	1.35	1.2	1.15	1.2	2.4
20	5.0	13.7	3.9	6.5	3.7	2.4	1.8	1.5	1.2	1.15	1.2	2.45
21	4.8	12.4	5.2	7.2	3.6	2.25	1.75	1.65	1.15	1.1	1.15	2.85
22	4.4	9.9	6.3	7.4	3.45	2.1	1.7	1.95	1.15	1.1	1.15	3.05
23	4.2	8.0	8.0	6.6	3.45	2.1	1.65	2.05	1.15	1.1	1.15	5.2
24	4.0	6.3	12.1	5.4	3.25	2.35	1.6	2.05	1.15	1.05	1.15	8.2
25	3.85	5.9	13.0	6.0	3.0	2.5	1.6	3.35	1.15	1.0	1.1	8.7
26	3.7	5.6	13.2	7.2	2.85	2.6	1.65	3.7	1.2	1.0	1.05	8.0
27	3.55	5.8	13.0	8.1	3.35	2.35	1.55	3.35	1.15	1.0	1.05	6.1
28	3.4	6.6	12.6	8.3	4.5	2.15	1.55	3.25	1.1	1.05	1.15	4.8
29	3.35	7.0	11.1	8.0	4.9	2.0	1.5	2.95	1.05	1.15	1.15	4.7
30	3.35	.....	9.0	6.0	4.0	1.9	1.45	2.55	1.0	1.15	1.15	4.6
31	3.35	.....	6.0	.....	3.85	.....	1.55	1.85	.....	1.1	.....	4.2

Rating table for Coosa River at Riverside, Ala., for 1906, 1907, and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	2,085	2.30	5,160	3.70	9,340	6.20	18,270
1.00	2,255	2.40	5,425	3.80	9,660	6.40	19,050
1.10	2,435	2.50	5,695	3.90	9,980	6.60	19,840
1.20	2,620	2.60	5,970	4.00	10,300	6.80	20,640
1.30	2,810	2.70	6,250	4.20	10,970	7.00	21,440
1.40	3,010	2.80	6,540	4.40	11,660	8.00	25,600
1.50	3,215	2.90	6,835	4.60	12,360	9.00	29,800
1.60	3,430	3.00	7,135	4.80	13,070	10.00	34,060
1.70	3,655	3.10	7,440	5.00	13,800	11.00	38,320
1.80	3,890	3.20	7,750	5.20	14,540	12.00	42,580
1.90	4,130	3.30	8,060	5.40	15,280	13.00	46,840
2.00	4,380	3.40	8,380	5.60	16,020	14.00	51,100
2.10	4,635	3.50	8,700	5.80	16,760	15.00	55,360
2.20	4,895	3.60	9,020	6.00	17,500		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 13 discharge measurements made during 1905–1907; one made during 1909 and on numerous measurements made prior to 1905. It is well defined. Above gage height 9 feet the rating curve is a tangent, the difference being 426 per tenth.

Monthly discharge of Coosa River at Riverside, Ala., for 1907 and 1908.

[Drainage area, 7,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	45,100	7,750	15,700	2.22	2.56	A.
February	40,400	8,700	19,600	2.78	2.90	A.
March	51,100	7,440	19,700	2.79	3.22	A.
April	18,300	7,440	10,600	1.50	1.67	A
May	38,300	9,660	15,900	2.25	2.59	A.
June	29,000	5,290	10,800	1.53	1.71	A.
July	9,020	4,130	5,980	.847	.98	A.
August	7,140	3,320	5,300	.751	.87	A.
September	21,800	2,620	6,400	.907	1.01	A.
October	10,300	2,810	4,090	.579	.67	A.
November	31,100	3,010	9,420	1.33	1.48	A.
December	27,300	5,420	11,500	1.63	1.88	A.
The year	51,100	2,620	11,200	1.59	21.54	

Monthly discharge of Coosa River at Riverside, Ala., for 1907 and 1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.						
January	35,800	8,220	18,000	2.55	2.94	A.
February	53,700	15,300	30,300	4.29	4.63	A.
March	47,700	9,980	20,300	2.88	3.32	A.
April	26,900	8,380	15,900	2.25	2.51	A.
May	14,500	6,690	10,300	1.46	1.68	A.
June	9,340	4,130	5,960	.844	.94	A.
July	11,700	3,110	4,930	.698	.80	A.
August	9,340	2,910	4,920	.697	.80	A.
September	10,600	2,260	3,650	.517	.58	A.
October	6,980	2,080	2,800	.397	.46	A.
November	3,660	2,340	2,750	.390	.44	A.
December	41,700	2,720	15,500	2.20	2.54	A.
The year	53,700	2,080	11,300	1.60	21.64	

ALABAMA RIVER AT SELMA, ALA.

The station is located at the iron highway bridge in Selma. It was originally established by the United States Engineer Corps, but is now maintained by the United States Weather Bureau. Discharge measurements were begun by the United States Geological Survey in 1900, and the station ratings were applied to the gage heights for 1899. The present gage, which is of the standard chain type, is the property of the United States Geological Survey and was installed March 21, 1906.

The datum of the gage has remained the same since the establishment of the station, but the bad condition and probable change in the low-water section of the gage has introduced some uncertainty in the low-water gage heights prior to the establishment of the present chain gage. Both banks are high but the left is subject to overflow at extreme high water. Conditions of flow are somewhat changeable, but a fairly good rating has been developed for recent years. Gage heights are available prior to 1899, but owing to changing conditions of flow the present ratings are not applicable.[a]

The following discharge measurement was made:

March 26, 1908: Width, 544 feet; area, 20,400 square feet; gage height, 35.97 feet; discharge, 106,000 second-feet.

[a] Data collected at this station prior to 1904 have been compiled in Water-Supply Paper No. 107, Water powers of Alabama.

Daily gage height, in feet, of Alabama River at Selma, Ala., for 1907 and 1908.

[Observer, Clarence F. Brislin.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	17.3	7.8	19.8	6.0	15.8	10.2	9.1	7.2	1.8	4.5	0.0	15.5
2	23.5	10.4	26.3	6.1	15.7	11.0	8.6	6.7	1.3	3.4	.0	15.5
3	26.9	18.5	31.7	6.1	14.0	13.3	8.0	5.4	.9	2.9	.1	11.5
4	28.3	24.9	35.3	6.1	12.6	14.9	8.2	4.5	.8	2.8	.1	9.7
5	28.2	28.8	37.2	6.1	11.7	15.1	9.4	5.1	.7	4.4	.6	7.9
6	26.4	31.5	37.5	6.4	11.5	14.2	8.3	4.7	.6	4.0	.5	6.5
7	23.6	33.4	36.5	6.8	11.4	12.7	6.9	3.9	.8	3.1	.3	5.4
8	19.7	33.9	34.2	7.9	12.3	10.6	5.7	3.2	2.1	2.5	.3	4.7
9	15.4	32.6	30.7	7.7	16.3	8.7	4.6	3.0	1.7	1.9	.2	4.3
10	12.3	29.8	25.9	8.1	18.6	7.5	4.0	3.5	1.4	1.6	.4	4.7
11	10.7	25.4	20.0	8.4	20.1	6.7	3.9	4.1	1.9	1.6	.5	6.9
12	9.8	19.9	15.0	8.2	19.9	6.5	3.5	4.0	2.5	1.7	.8	11.0
13	9.2	15.4	12.5	7.5	19.1	6.4	3.2	3.9	3.0	1.6	.7	11.0
14	8.7	12.6	11.4	6.7	17.8	7.2	3.2	4.7	2.9	1.4	.9	11.4
15	8.3	11.1	10.8	6.1	18.2	8.5	3.5	4.3	2.9	1.0	.8	13.6
16	7.9	10.1	10.7	5.6	22.9	9.2	4.2	3.6	2.3	.8	.9	15.6
17	7.6	9.4	11.3	5.7	29.3	8.7	5.9	3.1	1.6	.5	.2	15.6
18	7.3	8.7	11.2	6.7	32.6	7.3	6.0	2.5	1.2	.4	2.1	14.5
19	7.0	8.3	10.6	11.7	33.5	6.5	5.5	2.2	1.0	.3	2.4	13.5
20	6.9	8.0	10.0	13.4	32.2	5.9	5.1	2.7	.6	.2	1.2	12.2
21	7.0	7.8	9.4	14.8	28.4	5.3	4.5	3.4	.4	.2	1.7	10.6
22	7.7	7.6	8.9	14.5	22.1	4.7	3.6	3.2	.1	.1	3.1	8.9
23	8.6	7.3	8.4	16.1	15.5	4.3	3.5	2.8	.1	.1	10.6	10.4
24	8.3	7.1	8.0	20.7	11.4	4.1	3.7	2.7	.3	.1	18.6	15.0
25	7.9	7.9	7.6	23.8	10.8	4.1	3.4	2.8	.2	.0	23.2	19.0
26	7.4	9.2	7.4	23.9	11.0	4.7	3.1	2.6	7.3	.0	24.6	20.1
27	7.0	11.3	7.0	20.9	11.4	5.4	3.0	2.4	8.6	.0	23.4	18.3
28	6.7	13.4	6.7	17.5	12.8	5.3	3.6	2.2	8.1	.0	20.7	16.0
29	6.5	.....	6.4	15.1	13.5	6.0	6.5	1.9	7.6	.0	18.2	16.5
30	6.3	.....	6.3	13.9	13.8	6.7	6.3	1.7	6.4	.0	16.8	20.7
31	6.6	.....	6.1	.....	11.6	.....	6.1	1.7	.....	.0	.....	25.0
1908.												
1	28.6	10.9	14.7	26.1	34.0	9.2	2.7	2.2	3.3	− .5	− .5	− .2
2	31.5	20.1	13.6	20.0	29.4	8.5	2.5	1.7	2.3	− .5	− .5	.0
3	32.0	25.3	13.6	14.6	21.4	7.5	2.2	1.7	1.6	− .7	.0	.3
4	30.5	28.0	12.7	11.8	14.5	6.6	2.0	1.8	1.1	− .7	.3	.8
5	27.3	29.0	11.6	10.8	10.5	6.0	2.2	1.9	.7	− .8	1.1	1.2
6	24.2	25.5	12.1	9.6	12.0	6.7	2.9	1.7	.5	− .9	3.4	1.5
7	22.2	22.4	12.5	9.1	17.1	6.5	3.3	1.4	.4	− .9	3.7	1.7
8	22.0	17.6	11.8	8.7	20.8	5.9	3.3	1.4	.4	− .9	2.5	1.9
9	22.5	14.8	11.0	8.4	20.9	5.3	3.7	2.0	2.2	− .8	1.6	2.1
10	22.5	13.3	10.1	8.4	17.2	5.1	4.5	2.6	4.2	− .7	1.0	10.2
11	22.0	12.5	9.6	8.4	13.7	5.1	6.3	3.3	5.1	− .6	.9	15.0
12	21.0	18.0	9.1	8.2	12.0	5.0	6.1	3.5	4.6	− .4	.9	16.7
13	21.6	20.6	8.7	8.0	11.0	4.8	5.2	3.1	3.5	− .3	.7	16.5
14	21.7	22.2	8.6	7.5	9.7	4.6	4.4	3.2	2.3	− .3	.6	15.2
15	20.5	25.8	8.4	7.1	8.4	5.0	4.4	2.9	1.4	− .2	.3	12.1
16	18.1	31.3	8.4	8.0	7.9	5.1	4.8	2.4	.8	1.9	.2	8.3
17	16.2	35.0	8.4	12.3	7.7	4.6	4.1	1.7	.5	1.8	.0	5.5
18	14.9	37.6	8.4	14.9	7.9	4.3	3.1	1.2	.2	1.0	− .1	4.0
19	13.5	42.1	8.3	14.4	9.6	4.1	2.6	.7	.1	.5	− .2	3.3
20	12.3	43.0	7.8	13.5	11.2	3.8	2.2	.6	.0	− .1	− .2	2.9
21	11.2	42.7	7.6	12.5	12.4	3.6	2.0	.8	− .1	− .2	− .3	2.7
22	10.4	38.7	7.3	11.7	11.5	3.5	2.1	1.0	− .1	− .4	− .2	2.5
23	10.0	36.5	8.9	12.7	9.8	3.5	2.2	1.4	− .2	− .5	.0	2.4
24	9.6	33.1	18.1	13.9	8.2	3.8	2.4	2.4	− .3	− .6	.0	5.7
25	9.4	27.5	27.7	15.4	7.4	3.5	2.2	4.0	− .4	− .6	− .1	10.4
26	9.0	21.7	34.8	22.1	6.8	4.0	2.4	4.7	− .5	− .7	− .1	12.7
27	8.4	18.0	38.7	29.4	6.4	4.4	2.2	4.4	− .4	− .8	− .2	12.3
28	7.8	16.4	39.4	33.5	6.9	4.4	2.3	4.6	− .3	− .7	− .2	12.6
29	7.1	15.2	37.2	35.2	7.5	.3.7	2.8	4.8	− .2	− .7	− .3	10.8
30	7.1	.....	34.6	35.5	8.4	3.1	2.5	4.4	− .4	− .7	− .3	8.4
31	6.9	.....	30.9	.....	8.9	.....	2.3	3.9	.....	− .6	.....	6.4

Rating table for Alabama River at Selma, Ala., for 1906, 1907, and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
−0.90	4,660	1.40	8,520	4.40	14,200	21.00	54,500
− .80	4,820	1.50	8,700	4.60	14,600	22.00	57,200
− .70	4,980	1.60	8,880	4.80	15,000	23.00	59,900
− .60	5,140	1.70	9,060	5.00	15,400	24.00	62,600
− .50	5,300	1.80	9,240	5.20	15,820	25.00	65,300
− .40	5,460	1.90	9,420	5.40	16,240	26.00	68,000
− .30	5,620	2.00	9,600	5.60	16,660	27.00	70,800
− .20	5,780	2.10	9,790	5.80	17,080	28.00	73,600
− .10	5,940	2.20	9,980	6.00	17,500	29.00	76,400
0.00	6,100	2.30	10,170	7.00	19,600	30.00	79,200
.10	6,270	2.40	10,360	8.00	21,800	31.00	82,000
.20	6,440	2.50	10,550	9.00	24,000	32.00	84,800
.30	6,610	2.60	10,740	10.00	26,300	33.00	87,600
.40	6,780	2.70	10,930	11.00	28,600	34.00	90,400
.50	6,950	2.80	11,120	12.00	31,000	35.00	93,200
.60	7,120	2.90	11,310	13.00	33,450	36.00	96,000
.70	7,290	3.00	11,500	14.00	36,000	37.00	98,900
.80	7,460	3.20	11,880	15.00	38,600	38.00	101,800
.90	7,630	3.40	12,260	16.00	41,200	39.00	104,700
1.00	7,800	3.60	12,640	17.00	43,800	40.00	107,600
1.10	7,980	3.80	13,020	18.00	46,400	41.00	110,500
1.20	8,160	4.00	13,400	19.00	49,100	42.00	113,400
1.30	8,340	4.20	13,800	20.00	51,800	43.00	116,300

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 32 discharge measurements made during 1900–1906 and is well defined. Above gage height 18 feet the rating curve is a tangent, the difference being 275 per tenth.

Monthly discharge of Alabama River at Selma, Ala., for 1907 and 1908.

[Drainage area 15,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	74,400	18,100	33,100	2.15	2.48	A.
February	90,100	19,800	42,700	2.77	2.88	A.
March	100,000	17,700	44,600	2.90	3.34	A.
April	62,300	16,700	29,300	1.90	2.12	A.
May	89,000	28,100	46,000	2.99	3.45	A.
June	38,900	13,600	22,200	1.44	1.61	A.
July	24,900	11,500	16,100	1.05	1.21	A.
August	20,000	9,060	12,600	.818	.94	A.
September	23,100	6,270	10,500	.682	.76	A.
October	14,400	6,100	8,480	.551	.64	B.
November	64,200	6,100	19,000	1.23	1.37	A.
December	65,300	14,000	33,200	2.16	2.49	A.
The year	100,000	6,100	26,500	1.72	23.29	
1908.						
January	84,800	19,400	45,900	2.98	3.44	A.
February	116,000	28,400	67,700	4.40	4.74	A.
March	106,000	20,300	42,300	2.75	3.17	A.
April	94,600	19,800	39,600	2.57	2.87	A.
May	90,400	18,300	33,300	2.16	2.49	A.
June	24,500	11,700	15,600	1.01	1.13	A.
July	18,100	9,600	11,800	.766	.88	A.
August	15,000	7,120	10,600	.688	.79	A.
September	15,600	5,300	8,050	.523	.58	B.
October	9,420	4,660	5,580	.362	.42	B.
November	12,800	5,300	6,940	.451	.50	B.
December	43,000	5,780	19,800	1.29	1.49	A.
The year	116,000	4,660	25,600	1.66	22.50	

ELLIJAY RIVER AT ELLIJAY, GA.

This station is located at a wagon bridge in the town of Ellijay, about three-fourths mile above the junction of the Ellijay and Cartecay rivers. Miscellaneous discharge measurements were made during 1904. Beginning May 4, 1907, a daily record of gage heights was kept. This station was discontinued December 31, 1907.

The vertical staff gage is located 4 feet below the bridge from which discharge measurements are made. Conditions of flow appear to be practically permanent. A good rating has been developed for low stages.

Discharge measurements of Ellijay River at Ellijay, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 4	M. R. Hall	71	101	2.03	247
August 5	F. P. Thomas	74	92	1.66	178
Do	do	74	93	1.64	182
November 16	M. R. Hall	69	72	1.46	122
Do	do	69	70	1.45	112

Daily gage height, in feet, of Ellijay River at Ellijay, Ga., for 1907.

[Observer, J. R. Smith.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						3.9	2.0	1.85	1.6	2.9	1.8	1.9
2						2.5	2.0	1.8	1.6	2.2	1.85	1.8
3						3.6	2.0	1.75	1.9	2.0	1.8	1.8
4					2.1	2.3	1.9	1.7	1.9	1.9	1.8	1.8
5					1.9	2.1	1.9	1.7	1.8	1.9	1.75	1.8
6					1.9	2.0	1.8	1.65	1.8	1.85	1.7	1.8
7					2.9	1.8	1.8	1.6	1.7	1.85	1.65	1.8
8					2.2	1.7	1.8	1.6	1.7	1.8	1.6	1.8
9					2.1	3.5	1.8	1.6	1.65	1.75	1.6	1.9
10					2.1	2.5	1.7	1.6	1.6	1.75	1.6	2.1
11					2.6	2.2	1.7	1.55	1.9	1.7	1.6	2.0
12					2.1	2.0	1.9	1.55	1.8	1.7	1.6	1.95
13					2.1	2.0	2.5	1.9	1.7	1.7	1.6	1.8
14					1.95	2.1	2.5	1.9	1.65	1.65	1.6	2.2
15					2.9	1.9	2.0	1.95	1.6	1.6	1.6	2.4
16					2.3	1.9	1.9	1.95	1.6	1.6	1.6	2.4
17					2.1	1.9	1.85	1.95	1.55	1.55	1.6	2.3
18					2.05	1.8	1.8	2.55	1.5	1.5	1.7	2.3
19					2.05	2.0	2.9	1.95	1.45	1.45	1.8	2.1
20					1.95	1.9	2.5	1.9	1.4	1.4	1.8	2.0
21					1.9	1.8	2.2	1.8	1.4	1.4	1.8	1.9
22					1.9	1.8	1.9	1.7	1.4	1.4	2.0	1.9
23					1.9	2.0	1.8	1.9	1.4	1.35	3.0	2.5
24					1.9	2.0	1.8	1.8	3.5	1.35	3.0	2.5
25					2.1	3.0	1.7	1.8	2.5	1.3	2.9	2.45
26					2.3	2.5	1.7	1.8	1.9	1.3	2.8	2.4
27					1.95	2.0	1.9	1.75	2.5	2.3	2.6	2.4
28					1.9	1.9	1.9	1.7	3.3	1.9	2.4	2.35
29					1.85	2.0	1.85	1.65	2.9	1.85	1.9	2.35
30					1.85	2.0	1.9	1.6	2.2	1.85	1.9	3.5
31					3.1		1.9	1.6		1.8		3.2

Rating table for Ellijay River at Ellijay, Ga., for 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.30	85	2.00	240	2.70	410	3.40	591
1.40	105	2.10	264	2.80	435	3.50	618
1.50	126	2.20	288	2.90	460	3.60	646
1.60	148	2.30	312	3.00	485	3.70	674
1.70	170	2.40	336	3.10	511	3.80	702
1.80	193	2.50	360	3.20	537	3.90	730
1.90	216	2.60	385	3.30	564		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 13 discharge measurements made during 1904, 1905, and 1907, and is well defined below gage height 2 feet.

Monthly discharge of Ellijay River at Ellijay, Ga., for 1907.

[Drainage area, 90 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May 4–31	511	204	274	3.04	3.17	B.
June	730	170	296	3.29	3.67	B.
July	460	170	231	2.57	2.96	B.
August	372	137	188	2.09	2.41	B.
September	618	105	215	2.39	2.67	B.
October	460	85	178	1.98	2.28	B.
November	485	148	226	2.51	2.80	B.
December	618	193	283	3.14	3.62	B.

CONASAUGA RIVER AT BEAVERDALE, GA.

The station is located at upper Kings Bridge at Beaverdale, just below the mouth of Sugar Creek. It was established May 31, 1907, and was discontinued June 30, 1908. A fairly good rating has been developed for low stages.

Discharge measurements of Conasauga River at Beaverdale, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 31	F. A. Murray	109	375	3.50	618
August 16	do	86	183	1.66	141
October 23	Olin P. Hall	57	64	1.40	106

Daily gage height, in feet, of Conasauga River at Beaverdale, Ga., for 1907 and 1908.

[Observers, Geo. W. La Duke and W. C. Bryant.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.3	2.3	1.9	1.2	2.5	1.5	2.1
2						3.2	2.6	1.9	1.2	2.0	1.45	2.0
3						2.7	2.3	1.9	1.2	1.9	1.6	1.9
4						2.7	2.2	1.8	1.7	1.8	1.6	1.7
5						2.5	2.2	1.6	1.6	1.6	1.55	1.7
6						2.4	2.2	1.6	1.5	2.0	1.5	1.6
7						2.3	2.0	1.7	1.3	2.0	1.45	1.5
8						6.4	2.0	1.6	1.2	2.1	1.4	1.9
9						3.5	1.9	1.6	1.3	1.9	1.5	1.8
10						3.4	2.0	1.6	1.2	1.8	3.0	2.5

Daily gage height, in feet, of Conasauga River at Beaverdale, Ga., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
11						3.2	2.0	1.5	1.6	1.8	2.6	2.4
12						2.6	1.9	1.5	1.6	1.8	2.3	2.2
13						2.6	7.8	1.4	1.4	1.9	2.0	2.1
14						2.6	3.2	1.4	1.3	1.8	1.8	5.5
15						2.6	2.7	1.5	1.3	1.6	1.8	4.5
16						2.3	2.5	1.6	1.3	1.5	1.7	3.0
17						2.2	2.3	1.5	1.2	1.5	1.6	2.6
18						2.2	2.2	1.6	1.2	1.5	2.6	2.5
19						2.2	2.2	1.6	1.2	1.5	2.4	2.3
20						2.1	2.3	1.5	1.2	1.5	2.0	2.2
21						2.2	2.0	1.5	1.2	1.5	3.0	2.1
22						2.2	1.9	1.6	3.6	1.4	6.0	2.0
23						2.2	1.9	1.8	6.7	1.4	7.6	6.5
24						3.3	1.8	1.8	2.6	1.6	9.1	4.6
25						4.9	1.8	2.0	2.0	1.5	6.0	4.3
26						3.0	1.8	1.9	2.2	1.5	3.5	4.0
27						3.7	1.9	1.6	1.7	2.0	3.0	3.5
28						2.9	1.9	2.0	5.5	1.9	2.5	3.2
29						2.6	1.9	1.4	5.9	1.7	2.4	2.9
30						2.4	2.0	1.4	3.0	1.5	2.2	7.5
31					3.6		1.8	1.3		1.5		5.8

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	3.0	6.5	2.6	2.4	2.4	2.0	17	3.6	4.9	2.4	2.5	2.0	2.2
2	2.0	4.0	2.6	2.4	2.3	2.0	18	3.2	3.5	2.3	3.0	2.0	2.1
3	1.6	3.1	2.5	2.3	2.2	2.0	19	2.8	3.2	2.2	3.9	4.5	2.1
4	1.6	3.7	2.5	2.3	2.7	5.2	20	2.7	2.9	4.5	3.4	2.6	2.1
5	5.3	3.5	2.4	2.4	2.4	3.7	21	2.6	2.7	4.0	2.9	2.3	2.0
6	4.5	3.0	2.4	2.5	2.5	5.0	22	2.5	2.6	3.5	2.6	2.2	2.0
7	3.9	2.5	2.3	2.3	3.8	3.0	23	2.4	2.5	5.7	2.5	2.2	1.9
8	3.4	2.3	2.3	2.2	2.6	2.5	24	2.3	2.5	9.2	2.5	2.1	1.9
9	2.8	2.2	2.2	2.2	2.5	2.3	25	2.3	2.4	5.2	7.0	2.1	1.8
10	2.6	6.8	2.2	2.2	2.4	2.2	26	2.3	3.3	4.0	3.5	2.5	1.8
11	2.5	5.2	2.3	2.1	2.3	2.4	27	2.7	3.3	3.2	2.7	2.8	1.8
12	7.5	4.0	4.5	2.1	2.2	2.3	28	2.5	2.8	2.9	2.6	2.5	1.8
13	4.5	6.0	3.2	2.1	2.1	2.2	29	2.4	2.6	2.7	2.5	2.4	1.8
14	3.5	5.2	2.9	2.1	2.1	2.1	30	2.3		2.6	2.5	2.3	1.7
15	3.3	11.3	2.7	3.0	2.1	3.0	31	2.3		2.5		2.0	
16	3.0	6.5	2.5	2.9	2.1	2.4							

Daily discharge, in second-feet, of Conasauga River at Beaverdale, Ga., for 1907 and 1908.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.								1907.							
1	543	258	177	84	307	117	215	17	236	258	117	84	117	130	333
2	510	333	177	84	195	111	195	18	236	236	130	84	117	333	307
3	360	258	177	84	177	130	177	19	236	236	130	84	117	282	258
4	360	236	160	144	160	130	144	20	215	258	117	84	117	195	236
5	307	236	130	130	130	124	144	21	236	195	117	84	117	447	215
6	282	236	130	117	195	117	130	22	236	177	130	648	105	.....	195
7	258	195	144	94	195	111	117	23	236	177	160	.....	105	.....	.....
8	.....	195	130	84	215	105	177	24	543	160	160	333	130	.....	1,060
9	612	177	130	94	177	117	160	25	1,200	160	195	195	117	.....	920
10	577	195	130	84	160	447	307	26	447	160	177	236	117	612	801
11	510	195	117	130	160	333	282	27	685	177	130	144	195	447	612
12	333	177	117	130	160	258	236	28	417	177	195	.....	177	307	510
13	333	.....	105	105	177	195	215	29	333	177	105	.....	144	282	417
14	333	510	105	94	160	160	.....	30	282	195	105	447	117	236	.....
15	333	360	117	94	130	160	1,010	31	.....	160	94	.....	117	.....	.....
16	258	307	130	94	117	144	447								

Daily discharge, in second-feet, of Conasauga River at Beaverdale, Ga., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	447	.....	333	282	282	195	17	648	1,200	282	307	195	236
2	195	801	333	282	258	195	18	510	612	258	447	195	215
3	130	478	307	258	236	195	19	388	510	236	762	1,010	215
4	130	685	307	258	236	.....	20	360	417	1,010	577	333	215
5	.....	612	282	282	282	685	21	333	360	801	417	258	195
6	1,010	447	282	307	307	1,250	22	307	333	612	333	236	195
7	762	307	258	258	723	447	23	282	307	.....	307	236	177
8	577	258	258	236	333	307	24	258	307	.....	307	215	177
9	388	236	236	236	307	258	25	258	282	.....	.....	215	160
10	333	.....	236	236	282	236	26	258	543	801	612	307	160
11	307	.....	258	215	258	282	27	360	543	510	360	388	160
12	.....	801	1,010	215	236	258	28	307	388	417	333	307	160
13	1,010	.....	510	215	215	236	29	282	333	360	307	282	160
14	612	.....	417	215	215	215	30	258	.....	333	307	258	144
15	543	.....	360	447	215	447	31	258	.....	307	.....	195	.....
16	447	.....	307	417	215	282							

NOTE.—Daily discharge for 1907 and 1908 based on a fairly well-defined rating curve. From June 1, 1907, to June 30, 1908, the discharge was greater than 1,300 second-feet for all missing days.

ETOWAH RIVER NEAR BALL GROUND, GA.

This station is located at the iron bridge about 2½ miles from Ball Ground and one-fourth mile below the mouth of Long Swamp Creek, which is a large tributary of Etowah River. It was first established May 16, 1907, although miscellaneous measurements were made during 1905.

The vertical staff gage is located 75 feet below the bridge. The left bank does not overflow, but the right bank overflows about 500 feet beyond the end of the bridge approach at high stages. A good rating has been developed for low stages.

Discharge measurements of Etowah River near Ball Ground, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 16	F. A. Murray	93	388	4.02	1,250
June 20	do	80	313	3.04	758
August 8	F. P. Thomas	80	258	2.39	497
1908.					
May 14	M. R. Hall	87	385	4.05	1,290
Do	do	87	394	4.05	1,270

Daily gage height, in feet, of Etowah River near Ball Ground, Ga., for 1907 and 1908.

[Observer, R. O. Ellis.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	6.0	3.0	2.6	2.15	2.9	2.15	3.1
2	.....	.....	.....	.....	.....	4.3	2.9	2.55	2.1	2.65	2.45	2.95
3	.....	.....	.....	.....	.....	3.95	2.9	2.5	2.25	2.6	3.05	2.85
4	.....	.....	.....	.....	.....	3.6	4.4	2.4	2.8	2.55	2.55	2.8
5	.....	.....	.....	.....	.....	3.5	3.05	2.35	4.2	2.7	2.45	2.8
6	.....	.....	.....	.....	.....	3.45	2.9	2.45	2.6	2.45	2.5	2.8
7	.....	.....	.....	.....	.....	3.4	2.85	2.45	2.45	2.4	2.4	2.75
8	.....	.....	.....	.....	.....	3.3	2.75	2.4	2.35	2.5	2.4	2.7
9	.....	.....	.....	.....	.....	3.3	2.6	3.1	2.3	2.45	2.35	3.8
10	.....	.....	.....	.....	.....	3.25	2.65	2.55	2.2	2.4	5.2	6.2
11	.....	.....	.....	.....	.....	3.2	3.1	2.4	3.0	2.3	4.0	4.2
12	.....	.....	.....	.....	.....	3.35	2.9	3.6	2.5	2.3	3.05	3.6
13	.....	.....	.....	.....	.....	3.65	3.1	3.0	2.4	2.3	2.85	3.4
14	.....	.....	.....	.....	.....	3.55	2.9	2.7	2.25	2.3	2.65	5.5
15	.....	.....	.....	.....	.....	3.2	3.05	4.5	2.2	2.3	2.45	4.4
16	.....	.....	.....	.....	4.0	3.1	2.9	4.1	2.3	2.35	2.4	4.0
17	.....	.....	.....	.....	3.95	3.0	2.8	3.3	2.35	2.25	2.45	3.65
18	.....	.....	.....	.....	3.8	3.0	2.95	2.95	2.3	2.25	2.85	3.55
19	.....	.....	.....	.....	3.5	2.95	3.0	2.7	2.0	2.2	3.05	3.45
20	.....	.....	.....	.....	3.5	2.95	2.85	2.85	2.0	2.3	2.8	3.3
21	.....	.....	.....	.....	3.3	3.0	2.7	2.8	2.05	2.1	4.8	3.25
22	.....	.....	.....	.....	3.3	3.35	2.65	2.6	3.3	2.15	4.4	3.15
23	.....	.....	.....	.....	3.3	3.25	2.6	3.3	6.0	2.1	6.1	6.9
24	.....	.....	.....	.....	3.5	3.1	2.8	2.65	3.7	2.2	9.2	5.0
25	.....	.....	.....	.....	4.05	3.05	2.75	3.2	2.8	2.25	4.8	4.2
26	.....	.....	.....	.....	3.95	2.95	2.8	2.5	2.6	2.25	3.85	3.8
27	.....	.....	.....	.....	4.2	2.95	3.2	2.35	2.4	2.35	3.45	3.7
28	.....	.....	.....	.....	3.5	3.7	3.05	2.3	4.6	2.75	3.35	3.8
29	.....	.....	.....	.....	3.25	3.45	2.65	2.25	3.95	2.4	3.5	4.0
30	.....	.....	.....	.....	3.3	3.0	2.6	2.25	3.3	2.15	3.3	14.0
31	.....	.....	.....	.....	4.0	.....	2.65	2.2	.....	2.1	.....	8.9
1908.												
1	5.2	6.8	4.2	4.4	4.7	3.75	3.0	2.75	2.45	2.15	2.35	2.45
2	4.5	5.0	4.2	4.3	4.6	3.6	3.1	2.65	2.35	2.2	2.3	3.5
3	4.2	4.3	4.2	4.2	4.4	3.55	3.1	2.5	2.3	2.2	2.35	2.6
4	4.0	4.1	4.2	4.1	4.4	4.0	3.35	2.6	2.45	2.2	3.95	2.5
5	6.2	4.0	4.1	4.1	4.5	4.2	4.1	2.7	2.7	2.1	3.0	2.3
6	4.8	4.3	4.0	4.7	4.4	3.9	4.4	4.2	4.5	2.0	2.5	2.35
7	4.6	3.95	4.0	4.4	6.9	3.65	3.85	3.35	3.05	2.1	2.35	11.8
8	4.3	3.85	4.0	4.2	5.2	3.5	3.45	3.65	2.75	2.15	2.35	6.2
9	4.1	3.75	3.95	4.1	4.5	3.4	4.3	4.6	2.65	3.15	2.3	4.3
10	3.9	7.5	3.9	4.0	4.4	3.45	5.2	3.1	2.4	3.95	2.35	3.55
11	6.6	9.6	4.0	4.0	4.2	3.65	3.5	3.0	2.35	2.85	2.3	3.3
12	7.8	6.2	4.4	3.95	4.2	3.35	3.3	2.75	2.35	2.5	2.25	3.9
13	5.6	5.2	4.2	3.9	4.1	3.3	3.05	2.65	2.35	2.45	2.15	3.35
14	4.8	5.4	4.0	3.9	4.2	3.85	3.0	2.55	2.4	2.35	2.5	3.2
15	4.5	11.2	3.95	5.2	4.0	3.8	2.95	2.5	2.3	2.4	2.6	3.1
16	4.4	7.2	3.9	5.5	4.1	3.45	3.05	2.6	2.35	2.3	2.4	2.95
17	4.2	5.6	3.9	6.6	4.0	3.4	2.9	2.65	2.35	2.25	2.3	2.9
18	4.2	5.2	3.85	5.2	4.2	3.45	2.75	2.7	2.3	2.2	2.35	2.85
19	4.0	5.6	3.8	6.7	4.6	3.6	2.8	2.65	2.2	2.25	2.45	2.8
20	3.9	5.1	5.2	5.3	4.8	3.4	2.75	2.7	2.3	2.2	2.3	2.75
21	3.85	4.8	5.7	4.8	4.2	4.0	2.75	2.45	2.4	2.3	2.25	2.85
22	3.8	4.6	4.5	4.6	3.95	3.95	2.75	3.95	2.1	2.2	2.2	6.3
23	3.75	4.5	9.8	4.6	3.75	3.5	2.7	3.25	2.1	2.65	2.35	5.3
24	3.65	4.4	15.0	4.4	3.8	3.5	2.75	4.0	2.15	2.55	2.4	4.0
25	3.6	4.4	6.7	15.0	5.4	3.4	2.7	3.7	2.1	2.35	2.35	3.7
26	3.65	5.2	5.6	7.2	5.5	3.25	2.75	3.1	2.1	2.4	2.5	3.45
27	3.85	4.6	5.1	5.9	4.8	3.05	2.65	2.85	2.15	2.3	2.4	3.1
28	3.65	4.4	4.8	5.2	4.2	3.1	2.55	2.7	2.2	2.45	2.35	3.05
29	3.7	4.3	4.7	4.8	4.3	3.15	3.1	2.65	2.4	3.9	2.25	2.95
30	3.65	.....	4.6	5.0	4.2	3.05	2.9	2.6	2.2	2.95	2.2	2.85
31	3.8	.....	4.4	.....	3.85	.....	2.85	2.55	.....	2.45	.....	3.1

Daily discharge, in second-feet, of Etowah River near Ball Ground, Ga., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	2,530	730	555	382	685	382	775
2	.....	.....	.....	.....	.....	1,420	685	535	365	575	495	708
3	.....	.....	.....	.....	.....	1,220	685	515	418	555	752	662
4	.....	.....	.....	.....	.....	1,020	1,480	475	640	535	535	640
5	.....	.....	.....	.....	.....	975	752	455	1,360	595	495	640
6	.....	.....	.....	.....	.....	950	685	495	555	495	515	640
7	.....	.....	.....	.....	.....	925	662	495	495	475	475	618
8	.....	.....	.....	.....	.....	875	618	475	455	515	475	595
9	.....	.....	.....	.....	.....	875	555	775	435	495	455	1,140
10	.....	.....	.....	.....	.....	850	575	535	400	475	1,980	.....
11	.....	.....	.....	.....	.....	825	775	475	730	435	1,240	1,360
12	.....	.....	.....	.....	.....	900	685	1,020	515	435	752	1,020
13	.....	.....	.....	.....	.....	1,050	775	730	475	435	662	925
14	.....	.....	.....	.....	.....	1,000	685	595	418	435	575	2,180
15	.....	.....	.....	.....	.....	825	752	1,540	400	435	495	1,480
16	.....	.....	.....	.....	1,240	775	685	1,300	435	455	475	1,240
17	.....	.....	.....	.....	1,220	730	640	875	455	418	495	1,050
18	.....	.....	.....	.....	1,140	730	708	708	435	448	662	1,000
19	.....	.....	.....	.....	975	708	730	595	330	400	752	950
20	.....	.....	.....	.....	975	708	662	662	330	435	640	875
21	.....	.....	.....	.....	875	730	595	640	348	365	1,720	850
22	.....	.....	.....	.....	875	900	575	555	875	382	1,480	800
23	.....	.....	.....	.....	875	850	555	875	2,530	365	.....	.....
24	.....	.....	.....	.....	975	775	640	575	1,080	400	.....	1,860
25	.....	.....	.....	.....	1,270	752	618	825	640	418	1,720	1,360
26	.....	.....	.....	.....	1,220	708	640	515	555	418	1,160	1,140
27	.....	.....	.....	.....	1,360	708	825	455	475	455	950	1,080
28	.....	.....	.....	.....	975	1,080	752	435	1,600	618	900	1,140
29	.....	.....	.....	.....	850	950	575	418	1,220	475	975	1,240
30	.....	.....	.....	.....	875	730	555	418	875	382	875	.....
31	.....	.....	.....	.....	1,240	.....	575	400	.....	365	.....	.....
1908.												
1	1,980	.....	1,360	1,480	1,660	1,110	730	618	495	382	455	495
2	1,540	1,860	1,360	1,420	1,600	1,020	775	575	455	400	435	975
3	1,360	1,420	1,360	1,360	1,480	1,000	775	515	435	400	455	555
4	1,240	1,300	1,360	1,300	1,480	1,240	900	555	495	400	1,220	515
5	.....	1,240	1,300	1,300	1,54[illegible]	1,360	1,300	595	595	365	730	435
6	1,720	1,420	1,240	1,660	1,480	1,190	1,480	1,360	1,540	330	515	455
7	1,600	1,220	1,240	1,480	.....	1,050	1,160	900	752	365	455	.....
8	1,420	1,160	1,240	1,360	1,980	975	950	1,050	618	382	455	.....
9	1,300	1,110	1,220	1,300	1,540	925	1,420	1,600	575	800	435	1,420
10	1,190	.....	1,190	1,240	1,480	950	1,980	775	475	1,220	455	1,000
11	.....	.....	1,240	1,240	1,360	1,050	975	730	455	662	435	875
12	.....	.....	1,480	1,220	1,360	900	875	618	455	515	418	1,190
13	2,250	1,980	1,360	1,190	1,300	875	752	575	455	495	382	900
14	1,720	2,120	1,240	1,190	1,360	1,160	730	535	475	455	515	825
15	1,540	.....	1,220	1,980	1,240	1,140	708	515	435	475	555	775
16	1,480	.....	1,190	2,180	1,300	950	752	555	455	435	475	708
17	1,360	2,250	1,190	.....	1,240	925	685	575	455	418	435	685
18	1,360	1,980	1,160	1,980	1,360	950	618	595	435	400	455	662
19	1,240	2,250	1,140	.....	1,600	1,020	640	575	400	418	495	640
20	1,190	1,920	1,980	2,050	1,720	925	618	595	435	400	435	618
21	1,160	1,720	2,320	1,720	1,360	1,240	618	495	475	435	418	662
22	1,140	1,600	1,540	1,600	1,220	1,220	618	1,220	365	400	400	.....
23	1,110	1,540	.....	1,600	1,110	975	595	850	365	575	495	2,050
24	1,050	1,480	.....	1,480	1,140	975	618	1,240	382	535	475	1,240
25	1,020	1,480	.....	.....	2,120	925	595	1,080	365	455	455	1,080
26	1,050	1,980	2,250	.....	2,180	850	618	775	365	475	515	950
27	1,160	1,600	1,920	2,460	1,720	752	575	662	382	435	475	775
28	1,050	1,480	1,720	1,980	1,360	775	535	595	400	495	455	752
29	1,080	1,420	1,660	1,720	1,420	800	775	575	475	1,190	418	708
30	1,050	.....	1,600	1,860	1,360	752	685	555	400	708	400	662
31	1,140	.....	1,480	.....	1,160	.....	662	535	.....	495	.....	775

NOTE.—Daily discharge 1907–8 based on a well-defined rating curve. Beginning May 16, 1907, the discharge was greater than 2,600 second-feet for all missing days.

ETOWAH RIVER NEAR ROME, GA.

The station is located at Freemans Ferry about 5 miles above Rome and 1 mile below Dikes Creek. It was established August 17, 1904, to take the place of the station maintained at Rome about 5 miles below the present location. The original station at Rome was maintained from July 1 to December 31, 1903.

No change has occurred since the establishment of the station in the datum of the vertical staff gage, the lower section of which is about 250 feet below the ferry. Both banks are subject to overflow during high water. Conditions of flow are probably permanent, and an excellent rating has been developed for low stages.[a]

Discharge measurements of Etowah River near Rome, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 19	M. R. Hall	300	870	2.39	1,590
November 6	Warren E. Hall	300	732	1.95	1,030

Daily gage height, in feet, of Etowah River near Rome, Ga., for 1907 and 1908.

[Observer, R. M. Patillo.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	10.5	3.5	8.4	3.0	3.0	3.9	2.6	2.25	1.9	2.8	2.05	2.85
2	5.3	5.4	12.0	3.0	3.0	4.7	2.85	2.1	1.9	2.2	2.1	2.65
3	4.0	4.7	13.0	3.0	3.0	4.2	2.5	2.1	1.95	2.1	2.05	2.5
4	3.9	5.5	6.0	2.9	3.5	4.0	2.55	2.0	2.25	2.0	2.0	2.5
5	3.8	8.0	5.0	2.9	3.2	3.6	2.9	2.0	2.75	2.0	1.95	2.45
6	3.6	6.0	4.8	3.0	3.0	3.2	2.45	3.65	2.7	1.95	1.95	2.4
7	3.5	5.4	4.2	3.0	3.3	2.8	2.4	3.05	2.2	1.95	1.9	2.3
8	3.4	4.0	4.0	3.0	4.2	2.7	2.3	2.3	2.05	2.0	1.9	2.3
9	3.4	4.0	4.0	3.0	3.8	2.7	2.3	2.1	2.1	2.0	1.9	2.3
10	3.4	3.7	3.8	3.1	4.0	2.7	2.25	2.4	2.15	1.95	2.2	4.9
11	3.2	3.5	3.7	3.1	4.0	2.7	2.4	2.3	2.15	1.9	3.5	4.4
12	3.2	3.5	3.6	3.2	3.6	2.8	2.4	2.35	2.1	1.9	2.75	3.55
13	3.2	3.4	3.5	3.3	3.4	2.9	2.5	2.35	2.0	1.9	2.25	3.0
14	3.0	3.2	3.5	3.2	3.6	4.0	2.4	2.55	1.9	1.9	2.2	3.75
15	3.0	3.0	3.5	3.1	3.9	2.9	2.5	2.85	1.9	1.85	2.1	4.2
16	2.9	3.0	3.4	3.0	4.5	2.8	2.4	3.5	1.9	1.85	2.0	3.5
17	2.9	3.0	3.4	3.0	6.6	2.6	2.3	3.3	1.9	1.85	2.0	3.2
18	2.9	3.0	3.4	3.0	5.9	2.6	2.35	2.7	1.85	1.85	2.2	3.05
19	2.9	2.9	3.3	3.0	4.5	2.5	2.4	2.3	1.8	1.85	2.6	2.95
20	2.9	3.1	3.3	3.0	3.9	2.5	2.5	2.2	1.8	1.8	2.55	2.8
21	2.9	3.2	3.0	4.0	3.2	2.5	2.35	2.1	1.8	1.8	3.3	2.7
22	2.8	3.2	3.0	4.5	3.2	2.5	2.2	2.2	1.85	1.8	4.1	2.6
23	2.8	3.1	3.0	6.0	3.0	2.5	2.1	2.5	3.95	1.8	4.8	3.15
24	2.8	3.5	3.0	5.6	3.0	3.1	2.0	2.4	3.95	1.8	6.4	4.6
25	2.8	4.8	3.0	4.5	2.9	2.9	2.1	2.7	2.7	1.8	5.0	3.6
26	3.0	8.4	3.0	3.5	3.2	3.3	2.3	2.4	2.15	1.8	3.6	3.1
27	3.0	8.2	3.1	3.5	3.2	3.0	3.1	2.35	2.0	1.9	3.0	2.95
28	2.9	8.4	3.1	3.3	3.1	3.3	3.1	2.25	2.1	1.9	2.8	2.9
29	2.8	.....	3.0	3.2	3.1	3.5	2.75	2.0	2.85	2.0	2.65	3.1
30	2.8	.....	3.0	3.2	2.9	3.1	2.5	2.0	3.15	2.0	3.25	7.6
31	3.0	.....	3.0	.....	3.2	.....	2.4	1.9	.....	2.0	.....	11.8

[a] Data collected at this station prior to 1906 have been compiled in Water-Supply Paper No. 197, Water resources of Georgia.

Daily gage height, in feet, of Etowah River near Rome, Ga., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	6.6	6.3	3.75	3.7	3.7	2.9	2.3	2.15	1.95	1.7	2.05	1.9
2	4.0	6.0	3.6	3.7	3.6	2.8	2.3	2.1	1.9	1.7	1.95	2.45
3	3.7	4.2	3.6	3.6	3.5	2.75	2.3	2.0	1.9	1.65	2.0	2.35
4	3.45	3.7	3.55	3.45	3.4	3.0	2.5	2.0	1.9	1.65	2.05	2.15
5	4.1	3.7	3.5	3.4	3.45	3.15	3.2	2.1	1.9	1.7	2.1	2.0
6	5.0	3.65	3.45	3.8	3.7	3.05	3.7	2.5	4.2	1.7	2.05	2.0
7	4.2	3.6	3.4	3.85	5.2	2.9	4.0	2.65	3.3	1.65	2.0	7.7
8	4.2	3.3	3.35	3.6	5.0	2.75	3.05	2.7	2.4	1.6	2.0	10.5
9	3.7	3.2	3.3	3.45	3.9	2.7	2.7	3.1	2.1	2.0	1.95	4.6
10	3.35	3.85	3.2	3.4	3.55	2.65	3.35	2.8	2.0	4.4	2.0	3.15
11	3.3	9.8	3.2	3.4	3.45	2.7	3.65	2.35	1.95	2.85	2.0	2.85
12	5.3	7.8	3.4	3.25	3.35	2.75	2.75	2.2	1.9	2.3	2.0	2.7
13	5.6	5.2	3.6	3.2	3.25	2.65	2.5	2.1	1.9	2.0	1.9	2.75
14	3.4	4.6	3.4	3.2	3.2	2.7	2.4	2.0	1.9	2.0	1.9	2.55
15	3.4	10.8	3.3	3.75	3.2	2.85	2.3	2.0	1.85	1.9	1.95	2.4
16	3.55	11.8	3.2	4.9	3.45	2.8	2.35	1.95	1.8	1.9	2.0	2.35
17	3.5	7.2	3.15	4.2	3.6	2.65	2.3	1.95	1.8	1.85	1.95	2.3
18	3.4	5.1	3.1	4.2	3.55	2.65	2.2	2.0	1.75	1.85	1.9	2.3
19	3.25	4.8	3.1	5.2	3.3	2.6	2.3	2.1	1.75	1.8	1.9	2.3
20	3.15	4.8	3.2	4.8	3.4	2.6	2.3	2.25	1.75	1.8	1.9	2.3
21	3.1	4.3	5.0	4.0	3.25	2.5	2.2	2.0	1.9	1.8	1.9	2.4
22	3.05	4.0	4.4	3.75	3.05	3.35	2.1	2.1	1.9	1.8	1.9	4.2
23	3.0	3.9	7.3	3.6	3.0	2.85	2.1	2.5	1.9	1.8	1.9	6.0
24	2.9	3.7	15.8	3.6	3.0	2.65	2.1	2.85	1.8	1.85	1.9	4.3
25	2.9	3.75	12.6	8.7	3.2	2.7	2.1	3.35	1.8	1.9	1.9	3.2
26	2.9	5.3	6.4	10.0	4.2	2.6	2.1	2.75	1.7	1.9	1.9	2.9
27	2.9	4.8	4.8	5.4	3.85	2.45	2.1	2.45	1.7	1.9	1.9	2.7
28	2.9	4.2	4.4	4.5	3.2	2.4	2.1	2.25	1.7	1.9	1.85	2.55
29	2.85	3.95	4.2	4.1	3.05	2.35	2.15	2.1	1.75	2.35	1.85	2.5
30	2.85	.....	4.0	3.9	3.1	2.3	2.35	2.0	1.75	2.6	1.85	2.5
31	2.85	.....	3.85	.....	3.1	.....	2.2	2.0	.....	2.35	.....	2.5

Rating table for Etowah River near Rome, Ga., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	710	3.10	2,490	4.60	5,100	7.00	10,200
1.70	800	3.20	2,645	4.70	5,290	7.20	10,660
1.80	895	3.30	2,805	4.80	5,480	7.40	11,130
1.90	990	3.40	2,965	4.90	5,670	7.60	11,610
2.00	1,090	3.50	3,130	5.00	5,860	7.80	12,100
2.10	1,195	3.60	3,300	5.20	6,260	8.00	12,600
2.20	1,305	3.70	3,470	5.40	6,660	9.00	15,180
2.30	1,420	3.80	3,645	5.60	7,080	10.00	17,880
2.40	1,540	3.90	3,820	5.80	7,500	11.00	20,700
2.50	1,665	4.00	4,000	6.00	7,930	12.00	23,600
2.60	1,790	4.10	4,180	6.20	8,370	13.00	26,660
2.70	1,920	4.20	4,360	6.40	8,820	14.00	29,800
2.80	2,055	4.30	4,540	6.60	9,280	15.00	33,000
2.90	2,195	4.40	4,720	6.80	9,740	16.00	36,300
3.00	2,340	4.50	4,910				

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 17 discharge measurements made during 1904–1907, and is well defined below gage height 4 feet. Above gage height 7 feet the rating curve becomes uncertain and is only approximate at high stages.

Monthly discharge of Etowah River near Rome, Ga. for 1907 and 1908.

[Drainage area, 1,800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	19,300	2,060	3,220	1.79	2.06	A.
February	13,600	2,200	5,110	2.84	2.96	A.
March	26,700	2,340	5,030	2.79	3.22	A.
April	7,930	2,200	3,040	1.69	1.89	A.
May	9,280	2,200	3,390	1.88	2.17	A.
June	5,290	1,660	2,530	1.41	1.57	A.
July	2,490	1,090	1,620	.900	1.04	A.
August	3,380	990	1,610	.894	1.03	A.
September	3,910	895	1,440	.800	.89	A.
October	2,060	895	1,040	.578	.67	A.
November	8,820	990	2,210	1.23	1.37	A.
December	23,000	1,420	3,540	1.97	2.27	A.
The year	26,700	895	2,820	1.56	21.14	
1908.						
January	9,280	2,120	3,430	1.91	2.20	A.
February	23,000	2,640	5,810	3.23	3.48	A.
March	35,600	2,490	5,550	3.08	3.55	A.
April	17,900	2,640	4,650	2.58	2.88	A.
May	6,260	2,340	3,170	1.76	2.03	A.
June	2,880	1,420	1,970	1.09	1.22	A.
July	4,000	1,200	1,740	.967	1.11	A.
August	2,880	1,040	1,450	.806	.93	A.
September	4,360	800	1,140	.633	.71	A.
October	4,720	710	1,150	.639	.74	A.
November	1,200	942	1,040	.578	.64	A.
December	19,300	990	3,050	1.69	1.95	A.
The year	35,600	710	2,850	1.58	21.44	

AMICALOLA RIVER NEAR POTTS MOUNTAIN, GA.

The station is located at a covered wagon bridge known as Steels Bridge, 2 miles east of Potts Mountain post-office, and 15 miles from Ball Ground, Ga., which is the nearest railroad station. It was established June 21, 1907, and was discontinued December 31, 1908.

The vertical staff gage is located 30 feet below the bridge. The left bank is high and does not overflow; the right bank is lower and may overflow for a distance of about 100 feet at high stages. An approximate rating has been developed for low stages.

Discharge measurements of Amicalola River near Potts Mountain, Ga., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 21	F. A. Murray	51	116	1.64	160
August 7	F. P. Thomas	50	106	1.40	131
1908.					
May 15	M. R. Hall	52	126	1.94	273
Do	do	52	126	1.94	267

Daily gage height, in feet, of Amicalola River near Potts Mountain, Ga., for 1907 and 1908.

[Observer, J. A. Whitmore.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	1.6	1.5	1.35	1.6	1.4	1.65
2	.....	.....	.....	.....	.....	.....	1.65	1.45	1.35	1.55	1.6	1.6
3	.....	.....	.....	.....	.....	.....	1.65	1.45	1.4	1.5	1.5	1.6
4	.....	.....	.....	.....	.....	.....	1.75	1.4	2.0	1.5	1.5	1.55
5	.....	.....	.....	.....	.....	.....	1.65	1.4	2.2	1.6	1.45	1.5
6	.....	.....	.....	.....	.....	.....	1.6	1.4	1.9	1.5	1.45	1.5
7	.....	.....	.....	.....	.....	.....	1.55	1.4	1.4	1.5	1.4	1.5
8	.....	.....	.....	.....	.....	.....	1.55	1.4	1.4	1.55	1.4	1.5
9	.....	.....	.....	.....	.....	.....	1.5	1.4	1.4	1.5	1.4	3.0
10	.....	.....	.....	.....	.....	.....	1.5	1.4	1.35	1.5	1.45	1.9
11	.....	.....	.....	.....	.....	.....	2.0	1.4	2.0	1.45	1.45	1.9
12	.....	.....	.....	.....	.....	.....	1.8	1.4	1.4	1.4	1.5	1.85
13	.....	.....	.....	.....	.....	.....	1.8	1.45	1.4	1.4	1.45	1.8
14	.....	.....	.....	.....	.....	.....	1.6	1.7	1.4	1.4	1.45	3.0
15	.....	.....	.....	.....	.....	.....	1.75	2.1	1.4	1.4	1.4	2.2
16	.....	.....	.....	.....	.....	.....	1.7	1.8	1.4	1.4	1.4	1.9
17	.....	.....	.....	.....	.....	.....	1.5	1.5	1.4	1.4	1.4	1.8
18	.....	.....	.....	.....	.....	.....	1.5	1.45	1.4	1.4	1.75	1.8
19	.....	.....	.....	.....	.....	.....	1.55	1.45	1.4	1.4	1.5	1.7
20	.....	.....	.....	.....	.....	.....	1.5	1.4	1.4	1.35	1.5	1.6
21	.....	.....	.....	.....	.....	.....	1.5	1.4	1.4	1.3	2.5	1.6
22	.....	.....	.....	.....	.....	1.75	1.5	1.4	1.4	1.3	2.0	1.6
23	.....	.....	.....	.....	.....	1.8	1.5	1.4	6.0	1.35	5.5	3.0
24	.....	.....	.....	.....	.....	1.7	1.5	1.4	2.0	1.3	2.25	2.3
25	.....	.....	.....	.....	.....	1.7	1.75	1.55	1.6	1.3	2.2	2.2
26	.....	.....	.....	.....	.....	1.7	1.5	1.45	1.55	1.3	2.0	2.0
27	.....	.....	.....	.....	.....	1.65	1.6	1.4	1.5	1.5	1.9	2.0
28	.....	.....	.....	.....	.....	2.1	1.5	1.4	5.5	1.5	1.9	2.3
29	.....	.....	.....	.....	.....	1.7	1.5	1.4	2.6	1.45	1.8	2.5
30	.....	.....	.....	.....	.....	1.65	1.9	1.35	1.8	1.4	1.7	6.5
31	.....	.....	.....	.....	.....	.....	1.5	1.35	.....	1.4	.....	3.0
1908.												
1	2.5	2.8	2.1	2.2	2.3	1.9	1.6	1.5	1.4	1.3	1.35	1.6
2	2.4	2.3	2.1	2.2	2.25	1.9	1.6	1.5	1.4	1.3	1.3	1.5
3	2.2	2.1	2.05	2.1	2.2	1.9	1.6	1.5	1.4	1.3	1.3	1.4
4	2.0	2.0	2.05	2.1	2.2	2.25	1.6	1.5	1.4	1.3	1.3	1.4
5	3.0	2.0	2.05	2.0	2.2	1.9	1.7	1.5	1.45	1.3	1.3	1.4
6	2.2	2.0	2.0	2.5	2.5	1.85	2.0	1.5	1.7	1.3	1.3	1.4
7	2.1	2.0	2.0	2.1	2.6	1.85	1.9	1.55	1.5	1.3	1.3	9.0
8	2.1	1.9	1.95	2.0	2.2	1.8	1.75	1.7	1.4	1.6	1.3	5.0
9	2.0	1.9	1.95	2.0	2.1	1.8	2.4	1.75	1.4	1.5	1.3	3.0
10	2.0	3.1	1.95	2.0	2.1	1.8	2.3	1.6	1.35	1.6	1.3	2.0
11	1.9	3.2	2.0	2.0	2.1	1.8	1.8	1.5	1.35	1.4	1.3	1.9
12	3.0	2.6	2.0	2.0	2.05	1.8	1.7	1.5	1.35	1.3	1.3	1.9
13	2.5	2.5	2.0	2.0	2.0	1.8	1.7	1.5	1.35	1.3	1.3	1.8
14	2.3	2.65	2.0	2.0	2.0	2.0	1.6	1.5	1.35	1.3	1.35	1.8
15	2.2	8.2	2.0	3.0	2.0	1.8	1.6	1.4	1.35	1.3	1.35	1.6
16	2.2	3.1	2.0	2.5	2.0	1.75	1.6	1.4	1.35	1.3	1.3	1.5
17	2.1	2.7	1.95	3.0	2.1	1.7	1.55	1.5	1.35	1.3	1.3	1.5
18	2.1	2.5	1.95	2.3	2.0	1.7	1.55	1.5	1.35	1.25	1.3	1.5
19	2.1	2.65	1.95	2.6	1.95	1.7	1.5	1.4	1.35	1.25	1.3	1.5
20	2.0	2.5	2.4	2.5	1.95	1.7	1.5	1.4	1.4	1.25	1.3	1.5
21	2.0	2.3	2.3	2.35	1.95	1.7	1.5	1.4	1.4	1.25	1.3	1.5
22	1.95	2.3	2.2	2.4	1.9	1.7	1.5	1.8	1.35	1.25	1.3	2.7
23	1.9	2.2	2.8	2.4	1.9	1.7	1.5	1.6	1.35	1.3	1.3	2.4
24	1.9	2.2	3.9	2.3	1.9	1.8	1.5	1.6	1.3	1.3	1.3	1.8
25	1.9	2.2	3.5	4.3	3.6	1.75	1.5	1.6	1.3	1.3	1.3	1.7
26	1.9	2.5	2.5	2.5	3.5	1.7	1.5	1.6	1.3	1.3	1.3	1.7
27	1.9	2.3	2.4	2.7	2.2	1.7	1.5	1.6	1.3	1.3	1.3	1.6
28	1.9	2.2	2.35	2.5	2.0	1.7	1.5	1.5	1.35	1.35	1.3	1.6
29	1.95	2.2	2.3	2.3	2.0	1.65	1.6	1.5	1.3	1.5	1.3	1.6
30	1.9	.....	2.3	2.4	2.0	1.65	1.6	1.45	1.3	1.4	1.3	1.5
31	1.9	.....	2.3	.....	2.0	.....	1.5	1.4	.....	1.35	.....	1.5

Daily discharge, in second-feet, of Amicalola River near Potts Mountain, Ga., for 1907 and 1908.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.								1907.							
1	.....	154	130	102	154	110	168	17	.....	130	130	110	110	110	214
2	.....	168	120	102	142	154	154	18	.....	130	120	110	110	198	214
3	.....	168	120	110	130	130	154	19	.....	142	120	110	110	130	182
4	.....	198	110	290	130	130	142	20	.....	130	110	110	102	130	154
5	.....	168	110	375	154	120	130								
								21	.....	130	110	110	94	510	154
6	.....	154	110	250	130	120	130	22	198	130	110	110	94	290	154
7	.....	142	110	110	130	110	130	23	214	130	110	.....	102	.....	760
8	.....	142	110	110	142	110	130	24	182	130	110	290	94	398	420
9	.....	130	110	110	130	110	760	25	182	198	142	154	94	375	375
10	.....	130	110	102	130	120	250								
								26	182	130	120	142	94	290	290
11	.....	290	110	290	120	120	250	27	168	154	110	130	130	250	290
12	.....	214	110	110	110	130	232	28	330	130	110	.....	130	250	420
13	.....	214	120	110	110	120	214	29	182	130	110	560	120	214	510
14	.....	154	182	110	110	120	760	30	168	250	102	214	110	182	.....
15	.....	198	330	110	110	110	375	31	.....	130	102	.....	110	.....	760
16	.....	182	214	110	110	110	250								

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	510	660	330	375	420	250	154	130	110	94	102	154
2	465	420	330	375	398	250	154	130	110	94	94	130
3	375	330	310	330	375	250	154	130	110	94	94	110
4	290	290	310	330	375	398	154	130	110	94	94	110
5	760	290	310	290	375	250	182	130	120	94	94	110
6	375	290	290	510	510	232	290	130	182	94	94	110
7	330	290	290	330	560	232	250	142	130	94	94	.....
8	330	250	270	290	375	214	198	182	110	154	94	.....
9	290	250	270	290	330	214	465	198	110	130	94	760
10	290	.....	270	290	330	214	420	154	102	154	94	290
11	250	.....	290	290	330	214	214	130	102	110	94	250
12	760	560	290	290	310	214	182	130	102	94	94	250
13	510	510	290	290	290	214	182	130	102	94	94	214
14	420	585	290	290	290	290	154	130	102	94	102	214
15	375	.....	290	760	290	214	154	110	102	94	102	154
16	375	.....	290	510	290	198	154	110	102	94	94	130
17	330	610	270	760	330	182	142	130	102	94	94	130
18	330	510	270	420	290	182	142	130	102	.....	94	130
19	330	585	270	560	270	182	130	110	102	.....	94	130
20	290	510	465	510	270	182	130	110	110	.....	94	130
21	290	420	420	442	270	182	130	110	110	.....	94	130
22	270	420	375	465	250	182	130	214	102	.....	94	610
23	250	375	660	465	250	182	130	154	102	94	94	465
24	250	375	.....	420	250	214	130	154	94	94	94	214
25	250	375	.....	.....	.....	198	130	154	94	94	94*	182
26	250	510	510	510	.....	182	130	154	94	94	94	182
27	250	420	465	610	375	182	130	154	94	94	94	154
28	250	375	442	510	290	182	130	130	102	102	94	154
29	270	375	420	420	290	168	154	130	94	130	94	154
30	250	.....	420	465	290	168	154	120	94	110	94	130
31	250	.....	420	.....	290	.....	130	110	.....	102	.....	130

NOTE.—The daily discharge for 1907–8 is based on a rating curve, which is fairly well-defined below gage height 2 feet, but is only approximate above 2 feet. Beginning June 22, 1907, the discharge was greater than 760 second-feet for all missing days.

CHOCCOLOCCO CREEK AT JENIFER, ALA.

The station is located at the Louisville and Nashville Railroad bridge, 1¼ miles north of Jenifer and about three-fourths mile above the mouth of Salt Creek. It was established August 20, 1903, and was discontinued February 3, 1908.

The datum of the vertical staff gage, which is located 20 feet above the bridge, has remained the same since the establishment of the station. The right bank overflows under the trestle approach to the bridge at a gage height of about 6 feet. The left bank is high and will not overflow. Conditions of flow are probably permanent and a good rating has been developed for low stages.[a]

The following discharge measurement was made:

October 29, 1907: Width, 95 feet; area, 138 square feet; gage height, 2.08 feet; discharge, 147 second-feet.

Daily gage height, in feet, of Choccolocco Creek at Jenifer, Ala., for 1907 and 1908.

[Observer, W. J. Tolbert.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	6.7	8.6	5.2	3.1	3.4	3.5	2.8	2.3	2.0	2.1	2.0	2.7
2	5.9	8.7	7.3	3.0	3.2	3.2	2.6	2.3	2.0	2.1	2.0	2.5
3	4.0	7.5	6.7	2.8	3.1	3.0	2.7	2.2	2.0	2.1	2.1	2.4
4	3.7	5.5	5.6	2.8	3.6	2.9	2.7	2.2	2.1	2.0	2.1	2.35
5	3.5	6.5	5.0	2.8	3.4	2.9	2.6	2.2	2.1	2.1	2.0	2.3
6	3.3	5.8	4.7	3.1	3.5	2.8	2.6	2.2	2.2	2.1	2.0	2.25
7	3.2	4.7	4.6	3.0	3.7	2.8	2.5	2.2	2.1	2.1	2.1	2.2
8	3.1	4.1	4.5	3.1	3.9	2.7	2.4	2.1	2.0	2.0	2.0	3.3
9	3.0	3.8	4.4	3.0	4.0	2.7	2.4	2.1	2.0	2.0	2.0	3.1
10	3.0	3.6	3.2	2.9	3.9	2.7	2.4	2.1	2.1	2.0	2.0	3.0
11	3.0	3.4	3.2	2.8	3.8	2.7	2.4	2.2	2.1	2.0	2.0	2.9
12	3.0	3.3	3.2	2.75	3.7	2.7	2.4	2.3	2.1	2.1	2.2	2.9
13	3.0	3.3	3.2	2.75	3.4	2.7	2.5	2.2	2.25	2.0	2.1	2.8
14	2.9	3.2	3.1	2.7	3.8	2.7	2.5	2.2	2.0	1.95	2.0	2.7
15	2.85	3.1	3.5	2.7	5.9	3.1	2.65	2.2	1.9	2.0	2.0	3.2
16	2.8	3.0	3.3	2.7	6.3	2.75	2.5	2.3	2.1	2.0	2.0	3.1
17	2.8	3.0	3.1	3.2	6.6	2.7	2.4	2.2	2.0	1.95	2.0	2.7
18	2.8	3.0	3.0	3.2	4.2	2.7	2.3	2.2	2.0	1.9	2.1	2.6
19	2.8	3.0	3.0	3.6	3.7	2.6	2.3	2.2	2.0	1.9	2.1	2.6
20	3.0	3.0	2.9	3.9	3.2	2.5	2.3	2.1	2.0	1.9	2.2	2.5
21	3.1	3.0	2.9	3.3	3.2	2.5	2.3	2.1	1.9	1.9	2.5	2.5
22	3.1	2.9	2.9	3.2	3.2	2.5	2.3	2.1	2.1	2.0	2.8	2.4
23	2.8	2.9	2.85	4.1	3.2	2.7	2.3	2.2	2.9	2.0	3.2	2.6
24	2.7	2.8	2.8	3.25	3.1	2.9	2.2	2.2	2.7	1.9	3.7	2.7
25	2.7	3.3	2.8	3.2	3.2	2.7	2.2	2.2	2.2	1.9	3.3	2.7
26	2.8	3.2	2.8	3.3	3.2	3.1	2.2	2.1	2.1	2.0	2.7	2.6
27	2.9	3.2	2.8	3.2	3.6	2.7	2.4	2.1	2.0	2.0	2.5	2.5
28	2.8	3.8	2.8	3.2	3.1	3.0	2.7	2.0	2.1	1.9	2.4	2.5
29	2.7	.....	2.8	3.8	3.0	3.2	2.4	2.0	2.1	2.0	2.1	2.9
30	2.7	.....	2.8	3.4	3.0	3.2	2.8	2.0	2.2	1.9	2.8	3.7
31	3.0	.....	2.8	.....	3.3	.....	2.4	2.0	.....	2.0	.....	4.5

Day.	Jan.	Feb.	Day.	Jan.	Feb.	Day.	Jan.	Feb.	Day.	Jan.	Feb.
1908.			1908.			1908.			1908.		
1	5.2	4.6	9	3.3	.....	17	3.0	.....	25	2.6	.....
2	3.8	4.9	10	3.0	.....	18	2.9	.....	26	2.55	.....
3	3.25	3.8	11	3.0	.....	19	2.8	.....	27	2.5	.....
4	3.0	.....	12	3.6	.....	20	2.75	.....	28	2.5	.....
5	3.7	.....	13	3.5	.....	21	2.7	.....	29	2.5	.....
6	3.8	.....	14	3.25	.....	22	2.7	.....	30	2.5	.....
7	3.65	.....	15	3.0	.....	23	2.7	.....	31	2.5	.....
8	3.5	.....	16	3.0	.....	24	2.6	.....			

[a] Data collected at this station prior to 1904 have been compiled in Water-Supply Paper No. 107, Water powers of Alabama.

Rating table for Choccolocco Creek at Jenifer, Ala., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.90	109	3.00	470	4.10	1,015	5.40	1,920
2.00	130	3.10	515	4.20	1,075	5.60	2,080
2.10	153	3.20	560	4.30	1,135	5.80	2,260
2.20	178	3.30	605	4.40	1,195	6.00	2,440
2.30	205	3.40	650	4.50	1,260	6.20	2,620
2.40	235	3.50	700	4.60	1,325	6.40	2,800
2.50	270	3.60	750	4.70	1,395	6.60	3,000
2.60	305	3.70	800	4.80	1,465	6.80	3,200
2.70	345	3.80	850	4.90	1,535	7.00	3,400
2.80	385	3.90	905	5.00	1,610	8.00	4,500
2.90	425	4.00	960	5.20	1,760	9.00	5,600

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 33 discharge measurements made during 1903–1908, and is well defined below gage height 6 feet.

Monthly discharge of Choccolocco Creek at Jenifer, Ala., for 1907 and 1908.

[Drainage area, 272 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	3,100	345	621	2.28	2.63	A.
February	5,270	385	1,250	4.60	4.79	A.
March	3,730	385	895	3.29	3.79	A.
April	1,020	345	534	1.96	2.19	A.
May	3,000	470	876	3.22	3.71	A.
June	700	270	400	1.47	1.64	A.
July	385	178	258	.949	1.09	A.
August	205	130	169	.621	.72	A.
September	425	109	161	.592	.66	A.
October	153	109	129	.474	.55	A.
November	800	130	228	.838	.94	A.
December	1,260	178	385	1.42	1.64	A.
The year	5,270	109	492	1.81	24.35	
1908.						
January	1,760	270	524	1.93	2.22	A.

TALLAPOOSA RIVER AT STURDEVANT, ALA.

The station is located at the Central of Georgia Railroad bridge, one-quarter mile west of Sturdevant. It is 6 miles east of Alexander City, and about 5 miles below the mouth of Hillabee Creek. It was established July 19, 1900.

Measurements prior to 1906 were referred to a standard chain gage attached to the bridge. During 1906 the bridge was replaced by a new one and the present vertical staff gage was located at Stowe's boat landing, about 2,000 feet upstream. All gage readings on the new gage are reduced to conform to the standard gage readings at the bridge, thus eliminating any difference in the published records that arise from change in the gage. Both banks overflow for about 200 feet at extreme high stages. Conditions of flow appear to be somewhat changeable, but a fairly good rating has been developed.[a]

[a] Data collected at this station prior to 1904 have been compiled in Water-Supply Paper No. 107, Water powers of Alabama.

Discharge measurements of Tallapoosa River at Sturdevant, Ala., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907.					
July 30	Warren E. Hall	386	2,720	3.20	3,270
1908.					
March 28	Warren E. Hall	396	3,340	4.62	5,770
October 24	M. R. Hall	189	979	.73	591

Daily gage height, in feet, of Tallapoosa River at Sturdevant, Ala., for 1907 and 1908.

[Observer, C. J. Stowe.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	10.0	4.8	7.9	3.4	4.3	4.1	3.8	2.25	1.05	1.5	1.0	3.5
2	8.0	11.6	10.8	3.45	4.1	3.75	3.3	1.95	.95	1.5	1.05	3.15
3	6.6	9.5	10.1	3.4	3.8	3.6	3.25	2.15	.85	1.35	1.45	2.8
4	4.9	6.8	8.2	3.25	4.1	3.4	3.25	1.9	1.05	1.25	1.65	2.5
5	4.4	10.8	6.3	3.15	4.3	3.3	3.05	1.7	.9	1.25	1.55	2.35
6	4.1	8.7	4.1	3.3	3.9	3.3	2.6	1.6	1.6	1.15	1.5	2.25
7	3.9	6.8	4.7	3.45	7.1	3.05	2.35	1.9	1.7	1.35	1.35	2.15
8	3.85	5.4	4.4	4.1	5.8	2.85	2.25	1.8	1.45	1.35	1.25	2.15
9	3.7	4.9	4.3	4.0	6.5	2.8	2.35	1.95	1.25	2.4	1.15	2.2
10	3.7	4.5	4.1	3.6	5.2	2.8	2.5	2.35	1.05	1.9	1.5	4.9
11	3.6	4.3	4.1	3.25	4.8	2.75	2.35	1.7	3.95	1.6	2.25	5.0
12	3.55	4.1	4.0	3.15	4.7	3.15	2.55	2.4	2.85	1.45	2.25	4.1
13	3.5	4.1	3.9	3.05	4.4	2.8	2.35	2.85	1.5	1.25	2.05	3.6
14	3.5	4.0	3.9	2.95	4.1	3.6	2.25	3.05	1.35	1.15	1.8	5.0
15	3.4	3.9	4.2	2.85	8.7	4.0	2.2	2.4	1.35	1.05	1.6	4.5
16	3.3	3.8	4.1	2.85	9.7	3.3	2.6	1.95	1.25	1.0	1.45	4.2
17	3.3	3.7	4.0	6.8	7.5	2.95	2.6	1.7	1.15	1.0	1.35	3.8
18	3.25	3.6	3.8	6.0	5.2	2.7	2.35	2.7	1.0	1.0	1.5	3.3
19	3.25	3.55	3.7	5.6	4.6	2.6	2.05	2.25	1.0	1.05	1.6	3.25
20	3.55	3.6	3.65	5.4	4.1	2.5	1.9	1.95	.9	1.0	2.05	3.05
21	3.3	3.6	3.6	4.5	3.9	2.4	1.9	1.8	.8	.95	4.1	2.85
22	3.4	3.55	3.5	4.5	3.7	2.35	1.95	3.8	1.0	.9	6.7	2.7
23	3.3	3.45	3.45	7.0	3.5	2.35	2.05	2.7	3.7	1.0	8.0	7.5
24	3.25	3.4	3.4	6.6	3.7	2.7	1.9	1.95	2.6	1.05	7.5	6.1
25	3.2	4.3	3.3	5.2	3.6	2.8	1.7	1.7	1.95	1.0	5.6	4.7
26	3.3	4.7	3.3	4.5	3.6	3.5	2.35	1.5	1.9	1.05	4.1	4.0
27	3.5	5.3	3.25	4.1	5.0	3.3	3.9	1.6	1.6	1.05	3.4	3.5
28	3.35	6.1	3.2	4.4	4.9	3.2	3.25	1.5	1.5	1.15	2.95	3.3
29	3.25	.....	3.2	7.1	4.1	4.5	2.8	1.45	1.7	1.05	2.6	5.7
30	3.15	.....	3.15	5.1	3.65	4.1	3.25	1.35	1.6	1.0	3.4	6.6
31	3.7	.....	3.2	.....	4.4	.....	2.8	1.25	.....	1.0	.....	7.0
1908.												
1	6.8	10.7	4.1	3.7	3.8	3.05	1.6	1.5	1.25	.6	1.45	1.35
2	4.6	8.6	3.9	3.6	3.5	2.8	1.5	1.6	1.15	.55	1.6	2.45
3	4.1	6.5	3.85	3.55	3.4	2.65	1.9	1.6	1.05	.6	2.25	2.35
4	3.7	5.1	4.1	3.4	3.25	2.7	2.05	1.35	1.0	.6	4.7	2.05
5	5.0	4.4	4.4	3.3	3.15	3.7	1.8	2.05	.9	.7	3.6	1.8
6	5.2	4.5	4.0	3.4	4.5	3.05	2.35	2.35	3.3	.7	2.8	1.8
7	5.3	4.3	3.85	3.35	5.1	2.8	3.5	2.95	4.3	.75	2.2	2.5
8	5.0	4.1	3.7	3.4	4.6	2.85	3.6	2.35	3.25	.6	1.9	2.85
9	4.3	3.8	3.6	3.3	4.1	2.6	2.95	2.0	2.5	.6	1.6	4.25
10	3.9	5.0	3.5	3.25	3.75	2.4	2.5	1.9	1.95	.8	1.45	3.6
11	4.3	6.5	3.45	3.15	3.4	2.7	2.5	1.7	1.6	1.5	1.6	2.5
12	5.5	6.3	3.4	3.05	3.25	2.95	2.65	1.8	1.35	1.95	1.6	2.25
13	4.8	5.5	3.4	2.95	3.15	2.6	2.55	1.5	1.15	1.45	1.45	2.05
14	3.9	6.1	3.5	2.95	3.0	2.4	2.15	1.35	1.05	1.25	1.25	1.9
15	3.7	13.5	3.4	2.95	2.95	2.5	1.9	1.15	1.0	1.05	1.35	1.85
16	3.6	11.5	3.3	5.0	2.85	2.4	1.75	1.05	.9	1.0	1.35	1.75
17	3.6	8.6	3.3	5.0	2.95	2.35	1.7	1.0	.8	.9	1.3	1.7
18	3.5	6.2	3.25	4.2	4.3	2.15	1.5	1.05	.75	.8	1.25	1.7
19	3.4	6.6	3.25	3.7	5.0	2.05	1.5	1.8	.7	1.05	1.35	1.6
20	3.25	5.8	3.15	3.4	4.6	1.95	1.6	2.7	.65	.9	1.25	1.6
21	3.15	5.1	3.15	3.95	3.9	1.95	2.4	2.85	.65	.8	1.25	1.7
22	3.15	4.8	3.25	3.5	3.4	1.8	2.05	3.7	.7	.65	1.25	5.8
23	3.15	4.5	5.1	4.2	3.15	2.95	1.7	3.9	.8	.7	1.25	6.9
24	3.05	4.2	9.6	3.9	2.95	2.6	1.5	4.1	.7	.7	1.2	5.1
25	2.95	4.1	8.4	8.1	2.95	3.35	1.7	2.4	.7	.75	1.25	3.9

Daily gage height, in feet, of Tallapoosa River at Sturdevant, Ala., for 1007 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
26	2.85	4.1	6.7	8.2	3.7	2.7	3.4	2.8	0.7	0.75	1.25	2.85
27	2.95	4.7	5.2	8.2	4.2	2.4	2.4	2.7	.7	.6	1.25	2.7
28	2.9	4.5	4.6	6.0	3.9	1.9	1.95	2.45	.65	.9	1.2	2.4
29	2.85	4.2	4.2	4.3	3.3	1.8	1.85	2.05	.6	1.05	1.25	2.25
30	2.85	.....	3.95	3.95	3.9	1.7	2.0	1.7	.6	1.45	1.25	2.15
31	2.85	.....	3.9	.....	3.7	.....	1.95	1.45	.....	1.45	.....	2.05

Rating table for Tallapoosa River at Sturdevant, Ala., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.50	480	2.00	1,560	3.50	3,600	6.00	9,440
.60	530	2.10	1,670	3.60	3,770	6.20	10,000
.70	580	2.20	1,780	3.70	3,950	6.40	10,560
.80	635	2.30	1,900	3.80	4,130	6.60	11,140
.90	690	2.40	2,020	3.90	4,320	6.80	11,740
1.00	750	2.50	2,140	4.00	4,510	7.00	12,350
1.10	815	2.60	2,270	4.20	4,910	8.00	15,550
1.20	880	2.70	2,400	4.40	5,330	9.00	18,750
1.30	950	2.80	2,530	4.60	5,770	10.00	21,950
1.40	1,020	2.90	2,670	4.80	6,250	11.00	25,150
1.50	1,100	3.00	2,810	5.00	6,760	12.00	28,350
1.60	1,180	3.10	2,960	5.20	7,280	13.00	31,550
1.70	1,270	3.20	3,110	5.40	7,800	14.00	34,750
1.80	1,360	3.30	3,270	5.60	8,330		
1.90	1,460	3.40	3,430	5.80	8,880		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on over 30 discharge measurements made during 1900–1908 and is well defined below gage height 10 feet. Above gage height 7 feet the rating curve is a tangent, the difference being 320 per tenth.

Monthly discharge of Tallapoosa River at Sturdevant, Ala., for 1907 and 1908.

[Drainage area, 2,500 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	22,000	3,040	4,940	1.98	2.28	A.
February	27,100	3,430	8,030	3.21	3.34	A.
March	24,500	3,040	6,280	2.51	2.89	A.
April	12,700	2,600	5,600	2.24	2.50	A.
May	21,000	3,600	6,810	2.72	3.14	A.
June	5,550	1,960	3,110	1.24	1.38	A.
July	4,320	1,270	2,300	.920	1.06	A.
August	4,130	915	1,660	.664	.77	A.
September	4,420	635	1,270	.508	.57	B.
October	2,020	690	912	.365	.42	B.
November	15,600	750	3,140	1.26	1.41	A.
December	14,000	1,720	4,840	1.94	2.24	A.
The year	27,100	635	4,070	1.63	22.00	
1908.						
January	11,700	2,600	4,510	1.80	2.08	A.
February	33,200	4,130	9,900	3.96	4.27	A.
March	20,700	3,040	5,340	2.14	2.47	A.
April	16,200	2,740	5,310	2.12	2.36	A.
May	7,020	2,600	3,990	1.60	1.84	A.
June	3,950	1,270	2,220	.888	.99	A.
July	3,770	1,100	1,790	.716	.83	A.
August	4,710	750	1,800	.720	.83	A.
September	5,120	530	1,080	.432	.48	B.
October	1,510	505	715	.286	.33	B.
November	6,010	880	1,370	.548	.61	B.
December	12,000	985	2,690	1.08	1.24	A.
The year	33,200	505	3,390	1.35	18.33	

CAHABA RIVER AT CENTERVILLE, ALA.

The station is located at the iron highway bridge, one-fourth mile west of Centerville and one-half mile above the Mobile and Ohio Railroad bridge. It was established August 7, 1901, and was discontinued February 5, 1908.

The datum of the gage has remained the same since the establishment of the station. The right bank overflows at extreme high water and the left bank overflows under the approach to the bridge. Conditions of flow at this point are changeable. The rating table can only be considered as fair at low stages.[a]

The following discharge measurement was made:

October 26, 1907: Width, 122 feet; area, 330 square feet; gage height, 1.60 feet; discharge, 251 second-feet.

Daily gage height, in feet, of Cahaba River at Centerville, Ala., for 1907 and 1908.

[Observer, Mrs. Laura Lawson.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	18.3	9.5	17.6	3.0	9.5	11.6	2.7	2.3	1.5	2.4	1.5	3.2
2	14.0	22.0	22.5	2.7	8.6	10.5	3.7	1.9	1.6	2.3	3.5	3.0
3	9.3	23.8	20.2	2.7	7.5	7.3	3.5	1.7	2.5	2.2	3.7	2.9
4	7.4	16.6	16.5	2.7	7.3	6.0	3.4	1.9	2.0	2.1	3.5	2.6
5	6.7	21.5	10.7	7.4	6.9	4.8	2.8	2.0	1.9	2.1	2.0	2.6
6	5.7	18.8	8.5	5.3	6.1	4.7	2.5	1.9	1.5	1.7	1.9	2.5
7	5.3	13.5	7.2	4.6	10.1	4.0	2.3	2.3	1.4	1.4	1.7	2.4
8	4.8	10.0	6.3	4.0	14.9	3.8	2.2	2.0	1.4	2.4	1.7	2.4
9	4.7	8.2	5.7	3.5	12.5	3.5	1.7	2.4	2.0	2.1	1.7	2.7
10	4.5	7.2	5.2	3.3	10.6	4.0	2.0	2.3	2.0	2.0	1.6	6.2
11	4.4	6.2	4.8	3.0	10.5	3.2	2.0	2.3	1.9	1.9	1.5	5.9
12	4.2	5.4	4.3	3.0	7.5	4.0	3.1	2.7	1.9	1.8	1.5	4.3
13	4.0	5.3	4.3	3.0	7.2	3.4	2.7	2.9	1.8	1.7	1.4	4.7
14	3.8	4.7	4.2	3.0	6.3	3.8	2.4	2.2	1.8	1.6	1.4	6.9
15	3.7	4.2	5.7	3.0	25.2	4.8	3.3	2.1	1.9	1.5	1.3	6.9
16	3.5	4.2	5.2	2.8	23.3	3.8	2.9	2.0	1.8	1.5	1.4	5.8
17	3.5	4.0	4.5	11.5	18.1	3.4	2.5	3.0	1.6	1.4	1.4	6.4
18	3.5	4.0	4.3	10.5	13.2	3.2	2.4	1.8	1.5	1.4	1.4	4.4
19	3.0	4.0	3.8	17.8	8.9	3.0	1.9	1.6	1.5	1.4	1.5	4.3
20	5.8	3.8	3.7	14.8	8.5	2.9	1.3	1.5	1.4	1.4	1.6	4.3
21	7.1	3.6	3.7	8.7	8.2	2.4	2.0	2.6	1.4	1.4	2.4	3.4
22	5.6	3.2	3.5	9.7	7.0	2.4	2.4	1.9	5.0	1.4	6.0	6.9
23	4.7	3.5	3.5	18.3	5.9	3.5	2.4	1.7	7.9	1.4	11.2	6.0
24	4.4	3.5	3.3	13.5	4.1	3.3	2.4	1.7	12.0	1.4	10.5	5.9
25	4.0	7.3	3.3	10.0	7.5	2.9	2.4	1.6	11.5	1.4	7.9	5.4
26	4.0	5.7	3.3	9.5	7.9	2.4	1.9	1.4	7.4	1.2	6.9	4.6
27	4.0	5.4	3.2	8.3	8.5	2.4	2.0	1.4	2.9	1.2	4.4	4.0
28	3.6	7.0	3.0	6.9	7.8	2.3	4.2	1.4	2.6	1.3	3.4	6.0
29	3.4	.....	3.0	7.0	5.5	2.3	3.8	1.4	2.5	1.4	3.4	14.1
30	4.7	.....	3.0	7.6	5.1	2.5	3.7	1.4	2.4	1.6	3.3	16.6
31	5.7	.....	3.0	.....	7.0	.....	3.5	1.4	.....	1.7	.....	16.0

Day.	Jan.	Feb.	Day.	Jan.	Feb.	Day.	Jan.	Feb.	Day.	Jan.	Feb.
1908.			1908.			1908.			1908.		
1	12.6	15.3	9	8.1	.....	17	6.1	.....	25	3.7	.....
2	8.8	12.9	10	6.9	.....	18	5.8	.....	26	3.8	.....
3	7.0	10.8	11	7.7	.....	19	5.9	.....	27	3.7	.....
4	6.0	9.6	12	13.9	.....	20	5.2	.....	28	3.5	.....
5	8.7	8.5	13	13.7	.....	21	4.7	.....	29	3.4	.....
6	10.2	.....	14	10.0	.....	22	4.4	.....	30	3.3	.....
7	10.2	.....	15	7.4	.....	23	4.2	.....	31	3.7	.....
8	10.2	.....	16	6.9	.....	24	3.9	.....			

[a] Data collected at this station prior to 1904 have been compiled in Water-Supply Paper No. 107, Water powers of Alabama.

Rating table for Cahaba River at Centerville, Ala., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.20	152	3.00	638	4.80	1,332	9.00	3,500
1.30	176	3.10	669	4.90	1,376	10.00	4,050
1.40	200	3.20	701	5.00	1,420	11.00	4,600
1.50	225	3.30	733	5.20	1,512	12.00	5,150
1.60	250	3.40	766	5.40	1,604	13.00	5,700
1.70	275	3.50	800	5.60	1,698	14.00	6,250
1.80	300	3.60	836	5.80	1,794	15.00	6,800
1.90	326	3.70	874	6.00	1,890	16.00	7,350
2.00	352	3.80	912	6.20	1,990	17.00	7,900
2.10	378	3.90	950	6.40	2,090	18.00	8,450
2.20	405	4.00	990	6.60	2,192	19.00	9,000
2.30	432	4.10	1,030	6.80	2,296	20.00	9,550
2.40	460	4.20	1,072	7.00	2,400	21.00	10,100
2.50	488	4.30	1,114	7.20	2,510	22.00	10,650
2.60	517	4.40	1,156	7.40	2,620	23.00	11,200
2.70	546	4.50	1,200	7.60	2,730	24.00	11,750
2.80	576	4.60	1,244	7.80	2,840	25.00	12,300
2.90	607	4.70	1,288	8.00	2,950	26.00	12,850

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on one discharge measurement made during 1907 and the form of previous curves. It is not well defined. Above gage height 7 feet the rating curve is a tangent, the difference being 55 per tenth.

Monthly discharge of Cahaba River at Centerville, Ala., for 1907 and 1908.

[Drainage area, 1,040 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	8,620	640	1,760	1.69	1.95
February	11,600	701	3,300	3.17	3.30
March	10,900	638	2,320	2.23	2.57
April	8,620	546	2,620	2.52	2.81
May	12,400	1,030	3,840	3.69	4.25
June	4,930	432	1,120	1.08	1.20
July	1,070	176	544	.523	.60
August	638	200	345	.332	.38
September	5,150	200	833	.801	.89
October	460	152	269	.259	.30
November	4,710	176	887	.853	.95
December	7,680	460	1,840	1.77	2.04
The year	12,400	152	1,640	1.58	21.24
1908.					
January	6,200	733	2,440	2.35	2.71
February 1–5	6,960	3,220	4,830	4.64	.86

NOTE.—Owing to a rather poor rating curve and somewhat doubtful gage heights, values at this station can not be classed as better than C.

TOMBIGBEE RIVER AT COLUMBUS, MISS.

The station is located at the county highway bridge at the south end of Main street in the city of Columbus, Miss. Gage heights from 1900 to 1904 have been furnished by the United States Weather Bureau and estimates of discharge based thereon. On July 13, 1905, the present chain gage was installed by the United States Geological Survey at the highway bridge 1,000 feet above the gage of the United States Weather Bureau. The new gage was set to read the same as

the United States Weather Bureau gage at low water, which makes it practically on the same datum, as the low-water surface is almost level. The right bank is high and seldom overflows. The left bank overflows only under the bridge approach at a gage height of about 20 feet. The bed of the stream is of soft limestone or chalk, and conditions of flow are somewhat changeable at low stages. A good rating has been developed for 1907 and 1908.[a]

Discharge measurements of Tombigbee River at Columbus, Miss., in 1907 and 1908.

Date	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 22	Warren E. Hall	93	910	−3.51	366
1908.					
July 17	Warren E. Hall	100	1,020	−2.62	770

Daily gage height, in feet, of Tombigbee River at Columbus, Miss., for 1907 and 1908.

[Observer, C. R. Shackelford.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.3	6.8	11.6	−0.7	6.9	9.2	−1.9	−2.2	−3.5	−3.4	−3.5	−1.8
2	4.9	15.7	14.6	− .8	11.7	9.0	−2.0	−2.4	−3.5	−3.4	−3.5	−2.0
3	5.0	15.4	15.7	− .7	12.1	9.6	−1.3	−2.5	−3.5	−3.5	−3.3	−2.1
4	4.8	14.6	15.9	− .8	13.3	10.4	−1.5	−2.7	−3.6	−3.6	−3.1	−2.2
5	4.4	14.4	16.3	− .9	13.8	10.8	−1.6	−2.9	−3.6	−3.5	−2.9	−2.2
6	3.9	14.0	16.4	− .1	13.2	10.3	−1.6	−3.0	−3.7	−3.6	−2.6	−2.3
7	3.5	12.7	16.0	1.0	13.9	8.9	−1.5	−3.2	−3.7	−3.6	−2.7	−2.5
8	2.9	10.5	14.5	1.5	15.0	7.2	−1.8	−3.2	−3.7	−3.5	−3.0	−2.6
9	2.3	8.0	12.0	1.7	15.1	5.4	−2.2	−3.3	−3.6	−3.5	−3.2	−2.5
10	1.7	5.7	9.3	1.3	15.2	3.5	−2.5	−3.3	−3.6	−3.0	−3.1	−2.1
11	1.4	4.7	7.3	.6	15.7	1.4	−2.7	−3.3	−3.7	−2.8	−3.2	−1.7
12	1.4	3.9	5.5	− .1	15.6	2.8	−2.7	−3.2	−3.7	−2.4	−3.0	−1.4
13	1.6	2.8	3.8	− .5	14.6	1.7	−2.5	−3.2	−3.6	−2.5	−2.5	−1.1
14	1.8	1.7	2.5	− .9	12.5	1.0	−1.7	−3.3	−3.6	−2.9	−2.5	−1.0
15	1.6	.9	4.1	−1.2	13.0	1.9	− .5	−3.0	−3.6	−3.1	−2.6	− .5
16	1.2	.5	6.2	−1.4	13.8	3.6	− .9	−3.2	−3.6	−3.2	−2.9	− .7
17	.8	.2	7.0	−1.0	13.4	3.4	−1.3	−3.3	−3.6	−3.3	−2.7	− .8
18	.4	.0	7.5	1.5	13.3	2.1	−1.6	−3.4	−3.6	−3.5	−2.9	− .9
19	.2	− .2	7.2	2.7	14.2	0.6	−1.9	−3.5	−3.6	−3.6	−3.0	−1.1
20	.2	− .3	6.3	3.4	14.5	− .3	−2.2	−3.5	−3 7	−3.5	−3.0	−1.2
21	1.0	− .4	5.3	3.0	13.6	− .9	−2.3	−3.5	−3.7	−3.5	−2.7	−1.6
22	1.8	− .5	4.0	2.5	11.4	− .6	−2.4	−3.2	−3.7	−3.5	−1.9	−1.7
23	2.3	− .6	3.1	2.3	8.9	− .8	−2.4	−3.3	−3.6	−3.5	−1.6	−1.7
24	2.1	− .7	2.3	1.9	6.8	− .9	−2.5	−3.3	−2.7	−3.5	− .7	−1.0
25	1.8	1.3	1.3	1.3	4.6	−1.1	−2.4	−3.2	−2.4	−3.5	− .6	− .4
26	1.1	5.5	.5	.9	2.3	−1.1	−2.6	−3.2	−2.0	−3.5	− .5	− .2
27	.4	7.1	.2	.3	6.8	−1.2	−2.8	−3.3	−2.1	−3.5	− .7	.1
28	− .1	8.1	− .1	.0	10.2	−1.2	−1.0	−3.3	−2.6	−3.5	− .9	.1
29	− .4	.....	− .3	− .2	9.6	−1.2	−1.1	−3.3	−3.0	−3.6	−1.3	− .2
30	− .7	.....	− .5	2.9	9.9	−1.6	−1.7	−3.3	−3.2	−3.5	−1.7	− .4
31	− .6	.....	− .6	.....	9.8	.....	−1.8	−3.4	.....	−3.5	.....	1.5

[a] Data collected at this station prior to 1904 have been compiled in Water-Supply Paper No. 107, Water powers of Alabama.

Daily gage height, in feet, of Tombigbee River at Columbus, Miss., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	3.2	3.3	6.2	11.4	7.9	0.0	−2.5	−1.8	−2.9	−3.3	−3.6	−2.3
2	4.2	6.0	4.8	8.3	5.2	− .2	−2.6	−2.0	−3.1	−3.4	−3.6	−2.7
3	4.9	6.0	4.0	5.8	3.5	− .2	−2.7	−1.1	−3.1	−3.4	−3.6	−2.9
4	4.9	6.1	4.0	3.4	2.5	− .2	−2.5	.3	−3.2	−3.5	−3.6	−2.9
5	5.3	5.4	4.4	2.0	2.8	6.0	−2.4	1.5	−3.3	−3.5	−3.5	−2.8
6	6.3	6.6	5.0	1.4	13.5	8.7	−1.7	1.4	−3.3	−3.6	−3.5	−2.7
7	6.7	6.9	5.9	1.1	14.7	9.0	−1.1	1.1	−3.4	−3.6	−3.5	1.8
8	6.7	6.6	6.9	1.6	14.9	10.0	−1.1	2.0	−3.4	−3.6	−3.5	4.7
9	6.0	6.0	7.7	2.3	16.4	10.6	− .4	2.1	−3.4	−3.6	−3.5	5.2
10	4.9	6.9	7.6	2.5	17.1	10.0	− .2	1.6	−3.5	−3.6	−3.5	5.2
11	4.0	8.4	6.9	1.6	16.3	8.1	.6	.9	−3.5	−3.6	−3.5	5.0
12	3.9	8.4	6.4	.8	13.7	5.4	.4	.1	−3.5	−3.5	−3.5	3.4
13	4.0	10.4	5.6	.3	8.8	3.5	− .4	− .8	−3.5	−3.5	−3.5	1.7
14	4.1	14.4	4.8	.0	4.5	1.1	−1.4	−1.5	−3.6	−3.5	−3.4	.7
15	4.2	16.4	3.8	.2	3.1	1.0	−1.8	−1.8	−3.6	−3.6	−3.4	.2
16	4.0	18.2	2.9	.7	5.7	1.0	−2.3	−2.0	−3.6	−3.5	−3.3	− .2
17	4.4	20.5	2.1	2.4	6.2	1.4	−2.5	−1.8	−3.6	−3.5	−3.3	− .6
18	4.4	21.6	1.4	2.8	4.5	1.1	−2.7	−1.9	−3.7	−3.5	−3.2	−1.1
19	4.1	22.9	1.0	3.0	7.4	.4	−2.5	−1.8	−3.7	−3.5	−3.3	−1.4
20	3.7	23.2	.8	2.7	8.6	− .2	−2.6	−1.8	−3.7	−3.6	−3.3	−1.6
21	3.1	22.5	5.6	1.9	7.5	− .7	−2.4	−2.3	−3.7	−3.6	−3.3	−1.4
22	2.5	21.1	7.2	1.1	6.8	−1.1	−1.4	−2.3	−3.2	−3.6	−3.3	5.4
23	2.1	19.4	11.0	.6	5.5	−1.6	−1.1	−1.7	− .8	−3.6	−3.3	7.4
24	1.4	17.3	16.2	.1	3.5	−1.7	−1.3	−1.4	− .9	−3.6	−3.3	7.0
25	.9	14.9	17.8	1.6	1.7	−1.9	−1.8	− .7	−1.6	−3.6	−3.3	6.8
26	.6	12.4	19.4	6.6	.6	−2.0	−1.9	− .7	−2.2	−3.6	−3.2	6.5
27	.2	9.3	21.0	7.9	− .1	−2.1	−1 7	−1.0	−2.7	−3.6	−3.2	5.6
28	.1	8.4	21.1	9.4	− .5	−2.2	−1.6	−1.5	−2.9	−3.6	−3.2	3.4
29	.4	7.4	20.0	10.1	− .8	−2.2	−1.7	−2.0	−3.0	−3.6	−2.7	1.5
30	.5	.....	18.0	9.8	− .9	−2.4	−1.8	−2.4	−3.2	−3.6	−2.6	.6
31	.5	.....	14.8	.....	.2	.....	−1.6	−2.7	.....	−3.6	.....	.3

Rating table for Tombigbee River at Columbus, Miss., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
−3.70	310	−1.80	1,260	.20	2,755	8.00	12,540
−3.60	345	−1.70	1,325	.40	2,935	9.00	14,040
−3.50	380	−1.60	1,390	.60	3,115	10.00	15,590
−3.40	420	−1.50	1,455	.80	3,305	11.00	17,170
−3.30	460	−1.40	1,520	1.00	3,500	12.00	18,800
−3.20	500	−1.30	1,590	1.20	3,700	13.00	20,500
−3.10	545	−1 20	1,660	1.40	3,900	14.00	22,200
−3.00	590	−1.10	1,730	1.60	4,110	15.00	23,900
−2.90	635	−1.00	1,800	1 80	4,320	16.00	25,600
−2.80	685	− .90	1,870	2 00	4,540	17.00	27,300
−2.70	735	− .80	1,940	2 20	4,760	18.00	29,000
−2.60	785	− .70	2,015	2.40	4,990	19.00	30,700
−2.50	840	− .60	2,090	2.60	5,220	20.00	32,400
−2.40	895	− .50	2,170	2.80	5,450	21.00	34,100
−2.30	950	− .40	2,250	3.00	5,680	22.00	35,800
−2.20	1,010	− .30	2,330	4.00	6,920	23.00	37,500
−2.10	1,070	− .20	2,410	5.00	8,240	24.00	39,200
−2.00	1,130	− .10	2,495	6 00	9,620		
−1.90	1,195	.00	2,580	7.00	11,060		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 36 discharge measurements made during 1901–1908, and is well defined. Above gage height 12 feet the rating curve is a tangent, the difference being 170 per tenth.

Monthly discharge of Tombigbee River at Columbus, Miss., for 1907 and 1908.

[Drainage area, 4,440 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	8,640	2,020	4,550	1.02	1.18	A.
February	25,100	2,020	9,740	2.19	2.28	A.
March	26,300	2,090	11,800	2.66	3.07	A.
April	6,160	1,520	3,290	.741	.83	A.
May	25,100	4,880	18,600	4.19	4.83	A.
June	16,800	1,390	6,490	1.46	1.63	A.
July	2,170	685	1,210	.273	.31	B.
August	1,010	380	527	.119	.14	B.
September	1,130	310	449	.101	.11	B.
October	895	345	445	.100	.12	B.
November	2,170	380	957	.216	.24	B.
December	4,000	785	1,680	.378	.44	A.
The year	26,300	310	4,980	1.12	15.18	
1908.						
January	10,600	2,660	6,370	1.43	1.65	A.
February	37,800	6,040	19,800	4.46	4.81	A.
March	34,300	3,300	14,000	3.15	3.63	A.
April	17,800	2,580	6,640	1.50	1.67	A.
May	27,500	1,870	11,100	2.50	2.88	A.
June	16,500	895	5,290	1.19	1.33	A.
July	3,120	735	1,410	.318	.37	B.
August	4,650	735	2,040	.459	.53	A.
September	1,940	310	590	.133	.15	B.
October	460	345	364	.082	.09	B.
November	785	345	443	.100	.11	B.
December	11,600	635	4,730	1.07	1.23	A.
The year	37,800	310	6,060	1.37	18.45	

TOMBIGBEE RIVER AT EPES, ALA.

The station is located at the bridge of the Alabama Great Southern Railroad, one-half mile from Epes, Ala.

A record of approximate gage heights has been kept by the Alabama Great Southern Railroad for a number of years, being based on a gage painted on one of the bridge piers. During 1900 and 1901 discharge measurements were made by the United States Geological Survey and a rating developed for these years. November 29, 1904, the station was reestablished by the United States Geological Survey.

The datum of the chain gage, which is practically the same as that of the old gage, has remained the same since its installation. The right bank is high and is not subject to overflow. The left bank will not overflow until a stage of 38 feet has been reached. During floods it overflows for seven-eighths of a mile under the trestle approach to the bridge. Conditions of flow at this point are practically permanent and a good rating has been developed.[a]

Discharge measurements of Tombigbee River at Epes, Ala., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
October 25	Warren E. Hall	106	670	0.54	664
1908.					
March 25	Warren E. Hall	289	8,190	32.55	35,100

[a] Data collected at this station prior to 1904 have been compiled in Water-Supply Paper No. 107, Water powers of Alabama.

Daily gage height, in feet, of Tombigbee River at Epes, Ala., for 1907 and 1908.

[Observer, J. C. Horton.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	19.9	14.2	26.4	4.35	16.0	22.1	4.25	2.85	0.9	1.4	0.5	3.35
2	20.6	20.7	33.1	4.3	20.2	20.8	5.0	2.6	.85	.9	.65	3.05
3	18.8	25.4	36.0	4.15	22.9	19.7	4.55	2.25	.8	1.0	.7	2.85
4	17.2	29.4	37.0	3.8	24.8	18.8	4.25	2.05	.8	.95	.7	2.65
5	15.2	32.8	37.1	4.05	25.7	18.8	4.5	1.85	.7	.75	.9	2.5
6	14.0	34.7	36.8	5.0	26.4	18.9	3.85	1.85	.7	.65	1.05	2.35
7	12.4	35.2	36.6	7.8	30.4	18.8	3.75	1.55	.7	.6	1.4	2.15
8	11.4	35.4	36.3	8.1	32.6	17.8	3.65	1.35	.7	.65	1.5	2.0
9	10.4	34.9	35.8	7.9	34.6	15.8	3.3	1.2	1.05	.65	1.4	2.35
10	9.4	33.8	35.0	7.7	35.0	13.1	2.9	1.2	.85	.7	1.35	2.5
11	8.7	30.3	32.2	7.4	34.7	10.6	2.4	1.3	.7	.7	1.2	3.05
12	8.4	25.1	30.4	6.6	34.0	8.8	2.15	1.25	.65	.95	1.1	3.3
13	8.2	19.6	25.6	5.8	33.4	8.5	2.2	1.15	.7	1.35	1.0	3.75
14	8.2	15.8	19.9	5.2	33.2	8.2	2.35	1.1	.7	1.65	1.25	4.3
15	8.0	12.6	14.8	4.6	36.1	8.1	2.7	1.1	.75	1.8	1.5	4.95
16	7.6	9.2	12.6	4.4	36.6	7.8	3.3	1.2	.7	1.55	1.5	5.2
17	7.2	7.8	13.1	8.5	36.7	8.6	4.15	1.2	.7	1.3	1.5	4.95
18	6.6	6.9	14.0	9.2	36.0	9.3	3.45	1.25	.7	1.05	1.4	4.5
19	6.1	6.4	14.4	12.3	35.2	8.0	3.1	1.25	.65	.85	1.4	4.15
20	6.2	6.0	14.4	11.7	34.1	6.4	2.85	4.1	.5	.75	1.4	4.0
21	6.4	5.6	13.8	11.3	33.1	5.4	2.55	2.6	.5	.6	1.5	3.85
22	6.6	5.4	12.4	12.4	32.0	4.5	2.3	2.25	.5	.6	2.0	4.35
23	7.3	5.2	11.0	14.5	30.5	4.05	2.1	2.6	.5	.6	2.5	5.7
24	7.7	5.2	9.2	14.4	28.3	4.25	2.1	2.9	1.35	.6	3.35	4.9
25	7.6	7.3	8.3	12.4	25.2	4.0	2.0	2.4	1.2	.5	4.05	4.55
26	7.2	9.7	7.1	9.8	20.9	3.8	2.0	2.3	1.3	.5	4.45	5.1
27	6.7	13.6	6.2	7.8	17.6	4.05	1.95	2.3	1.65	.5	4.5	5.4
28	5.8	18.2	5.6	7.2	20.3	4.2	1.95	1.7	1.9	.5	4.3	5.9
29	5.3	.....	5.2	6.4	22.8	3.85	2.85	1.3	1.85	.5	3.95	9.0
30	5.0	.....	4.7	6.0	23.7	4.25	3.45	1.15	1.6	.5	3.75	10.2
31	7.4	.....	4.7	.....	22.8	.....	3.1	.95	.....	.5	.....	10.3
1908.												
1	9.5	13.7	38.9	39.7	18.0	6.0	2.6	3.25	1.95	1.05	.5	1.8
2	10.0	15.3	34.9	39.1	16.5	6.8	2.6	4.85	1.75	1.0	.5	2.2
3	10.5	16.3	29.4	37.2	13.4	6.4	2.8	13.4	1.6	.85	.65	2.1
4	11.0	15.7	23.1	33.3	10.8	6.0	2.4	12.6	1.35	.8	.7	2.0
5	12.3	14.8	18.5	26.8	15.2	8.2	2.2	14.0	1.3	.7	.7	2.0
6	12.9	14.7	15.6	18.4	30.2	13.2	2.7	13.5	1.3	.7	.7	2.2
7	13.5	14.9	14.5	12.9	33.6	16.2	2.95	11.0	1.45	.7	.7	3.35
8	13.7	15.3	14.2	9.0	35.0	17.4	3.8	8.7	1.6	.7	.7	9.6
9	13.5	15.1	14.5	8.5	35.4	17.9	4.25	8.7	1.35	.8	.7	12.8
10	12.9	16.3	15.1	9.0	35.2	18.4	5.2	9.6	1.15	.8	.8	13.8
11	13.9	18.9	15.1	9.2	35.0	18.2	6.0	8.4	1.0	.8	.8	13.6
12	14.8	20.2	14.5	8.6	34.6	16.6	6.2	7.0	1.0	.8	.8	13.0
13	14.1	21.6	13.7	7.6	34.1	13.7	6.0	5.4	.95	.8	.8	11.1
14	12.9	27.7	13.0	6.8	32.8	13.2	5.2	4.55	.85	.95	.8	9.0
15	11.8	35.2	11.4	12.2	30.0	11.7	4.2	4.0	.75	1.1	.8	7.4
16	11.5	37.3	9.7	17.5	26.4	10.2	3.45	3.4	.7	1.05	.8	6.6
17	11.2	38.3	7.7	16.4	25.6	8.9	2.95	2.95	.7	.85	.8	6.0
18	10.9	38.7	7.1	16.0	25.8	8.4	2.35	2.75	.7	.8	.9	5.6
19	10.7	41.3	6.9	15.5	28.0	7.8	2.1	4.05	.7	.7	.95	5.2
20	10.3	42.3	6.7	15.1	28.6	6.7	2.55	5.8	.7	.7	1.1	4.6
21	9.8	43.1	6.6	14.2	28.8	5.8	2.85	4.95	.7	.7	1.1	4.15
22	9.7	43.7	10.1	13.1	27.0	5.4	3.25	3.2	.7	.7	1.1	5.9
23	9.7	44.1	21.3	11.8	24.5	4.9	3.9	2.65	.7	.7	1.1	12.1
24	8.7	44.3	28.8	9.8	21.0	4.45	4.35	2.85	.9	.6	1.1	16.4
25	7.9	44.5	32.7	14.3	17.1	4.05	4.15	3.35	2.95	.6	1.1	17.1
26	7.3	44.5	34.5	17.4	13.7	3.55	4.5	4.05	2.75	.5	1.1	16.5
27	6.7	44.1	35.7	18.2	10.6	3.35	3.7	4.4	2.3	.5	1.1	15.4
28	6.1	43.1	36.6	18.2	8.8	3.1	4.2	4.2	2.0	.5	1.15	13.6
29	5.5	41.5	37.6	18.1	7.4	2.8	4.45	3.4	1.6	.5	1.25	11.5
30	5.1	.....	38.6	18.1	6.4	2.6	4.0	2.8	1.25	.5	1.45	8.8
31	6.3	.....	39.4	.....	5.6	.....	3.8	2.3	.....	.5	.....	7.3

Rating table for Tombigbee River at Epes, Ala., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.50	640	2.80	2,140	6.20	5,268	26.00	25,860
.60	695	2.90	2,215	6.40	5,476	27.00	26,900
.70	750	3.00	2,290	6.60	5,684	28.00	27,940
.80	810	3.10	2,370	6.80	5,892	29.00	28,980
.90	870	3.20	2,450	7.00	6,100	30.00	30,020
1.00	930	3.30	2,530	8.00	7,140	31.00	31,060
1.10	990	3.40	2,610	9.00	8,180	32.00	32,100
1.20	1,055	3.50	2,690	10.00	9,220	33.00	33,140
1.30	1,120	3.60	2,780	11.00	10,260	34.00	34,180
1.40	1,185	3.70	2,870	12.00	11,300	35.00	35,220
1.50	1,250	3.80	2,960	13.00	12,340	36.00	36,260
1.60	1,315	3.90	3,050	14.00	13,380	37.00	37,300
1.70	1,380	4.00	3,140	15.00	14,420	38.00	38,340
1.80	1,445	4.20	3,320	16.00	15,460	39.00	39,380
1.90	1,510	4.40	3,500	17.00	16,500	40.00	40,420
2.00	1,575	4.60	3,680	18.00	17,540	41.00	41,460
2.10	1,645	4.80	3,870	19.00	18,580	42.00	42,500
2.20	1,715	5.00	4,060	20.00	19,620	43.00	43,540
2.30	1,785	5.20	4,250	21.00	20,660	44.00	44,580
2.40	1,855	5.40	4,450	22.00	21,700	45.00	45,620
2.50	1,925	5.60	4,652	23.00	22,740		
2.60	1,995	5.80	4,856	24.00	23,780		
2.70	2,065	6.00	5,060	25.00	24,820		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 11 discharge measurements made during 1905–1908, and is well defined. Above gage height, 6 feet, the rating curve is a tangent, the difference being 104 per tenth.

Monthly discharge of Tombigbee River at Epes, Ala., for 1907 and 1908.

[Drainage area, 8,830 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	20,200	4,060	8,800	0.997	1.15	A.
February	35,600	4,250	17,600	1.99	2.07	A.
March	37,400	3,780	20,000	2.27	2.62	A.
April	13,900	2,960	7,000	.793	.88	A.
May	37,000	15,500	28,900	3.27	3.77	A.
June	21,800	2,960	9,660	1.09	1.22	A.
July	4,060	1,540	2,390	.271	.31	A.
August	3,230	900	1,470	.166	.19	A.
September	1,510	640	880	.100	.11	B.
October	1,440	640	842	.095	.11	B.
November	3,590	640	1,600	.181	.20	A.
December	9,530	1,580	3,640	.412	.48	A.
The year	37,400	640	8,570	.970	13.11	
1908.						
January	14,200	4,160	9,720	1.10	1.27	A.
February	45,100	13,100	29,900	3.39	3.66	A.
March	39,800	5,680	20,500	2.32	2.68	A.
April	40,100	5,890	16,600	1.88	2.10	A.
May	35,600	4,650	22,800	2.58	2.97	A.
June	18,000	2,000	8,310	.941	1.05	A.
July	5,270	1,640	2,960	.335	.39	A.
August	13,400	1,780	5,220	.591	.68	A.
September	2,250	750	1,120	.127	.14	A.
October	990	640	776	.088	.10	B.
November	1,220	640	867	.098	.11	B.
December	16,600	1,440	7,780	.881	1.02	A.
The year	45,100	640	10,500	1.19	16.17	

BLACK WARRIOR RIVER NEAR CORDOVA, ALA.

The station is located at the Kansas City, Memphis and Birmingham Railroad bridge, which crosses the river below the mouth of Cane Creek, 1 mile east of Cordova. It is 12 miles below the junction of Mulberry and Sipsey Forks and 6 miles below Blackwater Creek. May 21, 1900, discharge measurements were begun by the United States Geological Survey and the gage which had formerly been used by the United States Weather Bureau was repaired and read daily. Since 1904 the United States Engineer Corps has maintained the gage and furnished readings to the United States Geological Survey. The portion of the gage below 12 feet has been changed a number of times, and although the datum has been supposed to remain the same it is probable that the readings have been affected by these changes. The low-water portion is now in bad condition, making the recent low-water readings uncertain.

The lower 12 feet of the gage is an inclined timber fastened to a rock just below the bridge. The portion from 12 to 55 feet is a vertical timber fastened to the bridge pier on the left bank of the river. The right bank will not overflow. The left bank overflows only under the second span of the bridge. Conditions of flow at low stages are very changeable, and except when frequent ratings are made estimates of discharge are liable to considerable error. The rating for medium stages is accurate.[a]

Discharge measurements of Black Warrior River near Cordova, Ala., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
October 2	H. G. Stokes	180	472	−0.9	95
December 26	do	186	1,740	3.7	3,760

[a] Data collected at this station prior to 1904 have been compiled in Water-Supply Paper No. 107, Water powers of Alabama.

Daily gage height, in feet, of Black Warrior River near Cordova, Ala., for 1907 and 1908.

[Observer, Don M. Smith.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	14.5	2.9	9.3	0.7	4.0	7.2	0.1	−0.35	−0.75	−0.3	−0.7	0.45
2	8.8	19.5	19.3	.65	2.8	5.8	.1	−.4	−.75	−.4	−.65	.3
3	6.3	15.2	21.3	.6	2.2	4.2	1.7	−.35	−.8	−.4	−.65	.2
4	5.2	12.5	13.2	.6	2.6	3.4	1.0	−.45	−.85	−.4	−.55	.1
5	4.4	8.1	9.4	.55	2.4	2.6	.5	−.55	−.7	−.1	−.45	.0
6	3.8	5.8	6.5	1.5	3.1	2.1	.2	−.6	−.3	.8	−.35	−.1
7	3.1	4.0	5.4	1.8	5.6	1.6	.1	−.65	−.9	.4	−.3	−.2
8	2.5	3.2	4.3	2.1	9.9	1.2	.0	−.7	−.9	.45	−.3	−.2
9	2.0	2.4	3.6	1.7	10.9	1.1	−.2	−.7	−.9	.45	−.3	−.1
10	2.2	2.4	3.2	1.4	8.1	1.0	−.25	−.55	.6	.4	−.3	1.3
11	2.1	2.5	2.8	1.2	9.4	.9	−.3	−.65	.6	.2	−.25	1.9
12	2.0	2.6	2.45	1.0	9.6	.8	−.35	−.7	.75	.0	−.25	1.5
13	1.8	2.4	2.0	.8	6.0	.7	1.3	−.75	.9	−.3	−.2	1.0
14	1.6	2.2	1.7	.6	4.5	.6	2.0	−.7	.0	−.4	−.2	1.3
15	1.5	1.9	3.0	.5	12.6	.5	1.7	−.65	−.3	−.5	−.25	1.75
16	1.4	1.7	3.7	.45	15.1	.5	1.0	.0	−.4	−.55	−.25	1.75
17	1.4	1.5	3.2	1.4	8.8	.5	.5	−.2	−.4	−.55	−.25	1.3
18	1.4	1.4	2.8	1.3	5.8	.4	.3	−.3	−.4	−.55	−.2	1.05
19	1.4	1.4	2.3	1.2	4.4	.2	.2	−.4	−.5	−.6	.0	1.0
20	1.3	1.5	2.0	1.05	3.5	.1	.1	−.5	−.6	−.6	.1	.8
21	1.6	1.4	1.8	1.0	2.6	.1	.1	−.6	−.7	−.6	.5	.6
22	2.4	1.2	1.6	1.0	2.1	.1	.4	−.65	−.75	−.65	1.05	.5
23	1.8	1.0	1.4	1.3	1.8	.05	.25	−.7	.6	−.65	1.45	1.6
24	1.7	.9	1.3	2.0	1.6	.2	.1	−.75	.9	−.65	2.45	4.0
25	1.6	7.8	1.2	1.7	1.1	1.6	.0	−.85	.2	−.65	1.8	3.0
26	1.5	8.7	1.0	1.4	.9	1.1	−.2	−.9	.0	−.7	1.3	2.0
27	1.4	9.9	.85	1.2	3.4	.8	−.3	−.9	.0	−.7	.9	1.55
28	1.3	7.5	.8	1.2	3.0	.5	−.4	−.95	.1	−.65	.6	1.3
29	1.2	.....	.8	2.5	2.4	.3	−.3	−1.0	−.1	−.7	.5	1.9
30	1.1	.....	.7	2.8	2.0	.2	−.25	−.8	−.2	−.7	.55	2.1
31	1.2	.....	.7	.....	2.9	.....	−.3	−.7	.....	−.7	.....	3.9
1908.												
1	3.7	5.0	3.7	3.3	2.0	2.7	−.3	.2	−.6	−.9	−.9	−.4
2	2.9	9.0	3.1	2.75	1.6	1.85	−.4	−.3	−.7	−.9	−.9	.0
3	2.05	5.7	3.6	2.3	1.3	1.55	−.45	−.1	−.7	−.9	−.4	−.1
4	2.4	4.7	16.5	1.95	1.0	1.85	−.2	−.2	−.75	−.9	−.2	−.2
5	4.1	3.7	12.8	1.75	2.35	2.7	.0	−.25	−.65	−.9	−.2	−.3
6	7.0	4.6	9.2	4.2	19.4	3.1	.2	−.3	−.55	−.9	−.3	−.2
7	5.2	4.4	7.3	8.6	21.5	2.1	.1	−.4	−.65	−.9	−.5	17.0
8	3.9	3.7	5.8	5.8	13.3	1.65	.0	−.45	−.7	−.9	−.6	17.5
9	3.3	3.0	4.4	3.5	7.5	1.2	1.1	−.2	−.75	−.8	−.65	6.0
10	2.85	5.3	3.75	2.8	4.9	.85	.6	−.3	−.8	−.8	−.65	2.3
11	2.2	12.3	3.1	2.0	3.9	1.0	.2	−.35	−.85	−.7	−.65	1.8
12	6.7	9.8	3.9	1.75	2.9	1.0	.05	−.4	−.9	−.7	−.7	1.5
13	6.7	8.6	3.55	1.5	2.45	.9	.05	−.45	−.9	−.7	−.7	1.0
14	5.6	14.0	3.0	1.3	1.9	.7	−.1	−.5	−.9	−.75	−.7	.8
15	4.1	22.8	2.75	1.2	1.8	1.6	−.2	−.55	−.9	−.75	−.7	.7
16	3.3	24.3	2.6	2.3	6.5	2.15	−.3	−.6	−.9	−.75	−.7	.6
17	3.7	16.5	2.4	2.6	6.4	1.5	−.2	−.7	−.95	−.8	−.7	.5
18	3.4	9.2	2.15	2.0	6.0	.85	−.3	−.5	−.95	−.8	−.7	.4
19	3.1	12.5	1.9	1.8	10.1	.55	−.15	−.6	−.95	−.8	−.7	.4
20	2.7	16.2	2.6	2.0	8.8	.3	.0	−.7	−.95	−.8	−.7	.3
21	2.35	9.2	12.0	2.5	5.8	.0	.85	−.8	−.95	−.8	−.7	.3
22	2.2	7.0	8.5	2.15	4.4	−.1	.5	−.4	−.95	−.8	−.7	6.1
23	2.05	6.0	12.0	1.85	3.05	−.1	.2	.2	−.95	−.85	−.75	13.2
24	1.9	5.0	26.8	1.5	2.7	.3	.1	.8	−.95	−.85	−.75	8.6
25	1.65	4.0	24.5	4.2	1.75	.5	.0	.3	−1.0	−.85	−.7	5.2
26	1.4	4.9	16.8	6.0	.85	.3	.3	.5	−1.0	−.85	−.4	4.1
27	1.35	5.8	9.4	4.8	4.2	.0	.5	1.0	−1.0	−.85	−.1	2.9
28	1.3	5.0	6.8	3.5	4.3	−.1	.4	.3	−1.0	−.85	−.2	2.1
29	1.15	4.2	5.6	2.45	2.2	−.15	.2	−.3	−.9	−.85	−.3	1.8
30	1.0	.....	4.8	2.15	3.8	−.2	.0	−.4	−.9	−.85	−.4	1.5
31	1.0	.....	4.0	.....	5.1	.....	−.1	−.5	.....	−.85	.....	1.3

Rating tables for Black Warrior River near Cordova, Ala.

FOR 1906 AND 1907.[a]

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
−1.00	28	0.70	1,075	2.80	3,290	11.00	14,650
− .9	53	.80	1,170	3.00	3,525	12.00	16,150
− .8	80	.90	1,265	3.20	3,765	13.00	17,650
− .7	110	1.00	1,360	3.40	4,005	14.00	19,150
− .6	145	1.10	1,455	3.60	4,260	15.00	20,650
− .5	190	1.20	1,550	3.80	4,520	16.00	22,150
− .4	240	1.30	1,650	4.00	4,780	17.00	23,650
− .3	300	1.40	1,750	4.20	5,040	18.00	25,150
− .2	365	1.50	1,850	4.40	5,300	19.00	26,650
− .1	430	1.60	1,955	4.60	5,560	20.00	28,150
0.00	500	1.70	2,060	4.80	5,820	21.00	29,650
.10	575	1.80	2,165	5.00	6,080	22.00	31,150
.20	650	1.90	2,270	6.00	7,430	23.00	32,650
.30	730	2.00	2,380	7.00	8,830	24.00	34,150
.40	810	2.20	2,600	8.00	10,230	25.00	35,650
.50	895	2.40	2,830	9.00	11,650	26.00	37,150
.60	985	2.60	3,060	10.00	13,150	27.00	38,650

FOR 1908.[b]

−1.00	70	− .4	290	.20	685	.80	1,170
− .9	95	− .3	345	.30	760	.90	1,265
− .8	125	− .2	405	.40	835	1.00	1,360
− .7	155	− .1	470	.50	915		
− .6	195	.0	540	.60	995		
− .5	240	.10	610	.70	1,080		

[a] The above table is not applicable for obstructed-channel conditions. It is based on discharge measurements made during 1900 to 1906, and is well defined between gage heights 1 and 14 feet. Below gage height 1 foot the 1906 rating curve is assumed to apply to 1907, although no measurements were made during 1907 to confirm this. See 1908 rating. Above gage height 8.8 feet the rating curve is a tangent, the difference being 150 per tenth.

[b] The above table is not applicable for obstructed-channel conditions. It is based on one discharge measurement made during 1908 and the general form of the 1906 to 1907 rating curve and is well defined between gage heights 1 foot and 14 feet. Below gage height 0.5 foot the rating is radically different from that for 1907 as based on the low-water measurement made during 1908. General intercomparisons of discharge in the Black Warrior and adjacent drainage basins for 1907 and 1908 tend to show that the rating curves as used above are essentially correct. Above gage height 1 foot the 1908 rating is the same as for 1907.

Monthly discharge of Black Warrior River near Cordova, Ala., for 1907 and 1908.

[Drainage area, 1,900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	19,900	1,460	3,460	1.82	2.10	B.
February	27,400	1,260	6,180	3.25	3.38	B.
March	30,100	1,080	5,620	2.96	3.41	B.
April	3,290	852	1,610	.847	.94	B.
May	20,800	1,260	6,350	3.34	3.85	B.
June	9,110	538	1,850	.974	1.09	B.
July	2,380	240	766	.403	.46	B.
August	500	28	158	.083	.10	C.
September	1,260	53	419	.221	.25	B.
October	1,170	110	321	.169	.19	B.
November	2,890	110	698	.367	.41	B.
December	4,780	365	1,640	.863	.99	B.
The year	30,100	28	2,420	1.28	17.17	

Monthly discharge of Black Warrior River near Cordova, Ala., for 1907 and 1908—Con.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.						
January	8,830	1,360	3,770	1.98	2.28	B
February	34,600	3,520	11,200	5.89	6.35	B.
March	38,400	2,270	9,740	5.13	5.91	B.
April	11,100	1,550	3,490	1.84	2.05	B.
May	30,400	1,220	6,810	3.58	4.13	B.
June	3,640	405	1,460	.768	.86	B.
July	1,460	265	616	.324	.37	B.
August	1,360	125	424	.223	.26	B.
September	218	70	111	.058	.06	C
October	155	95	117	.062	.07	C.
November	470	95	218	.115	.13	B.
December	24,400	290	4,280	2.25	2.59	C.
The year	38,400	70	3,520	1.85	25.06	

BLACK WARRIOR RIVER NEAR COAL, ALA.

The station is located one-fourth mile below the mouth of Locust Fork of Black Warrior River, near the foot of the rapids known as Fork Shoals. It is one-half mile above Taylors Ferry, which is 3 miles from Coal and 20 miles from Bessemer, Ala., the nearest railroad station. It was established September 2, 1908. The gage heights and discharge measurements have been furnished by the Tennessee Coal, Iron, and Railroad Company.

The vertical staff gage is located at Taylors Ferry, one-half mile below the measuring section. The left bank is high and does not overflow. The right bank overflows for about 200 feet at high stages. An excellent rating has been developed for 1908.

Discharge measurements of Black Warrior River near Coal, Ala., in 1908 and 1909.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1908.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
September 2	H. G. Stokes	550	772	1.05	473
September 8	do	555	1,070	2.00	1,750
September 18	do	441	550	.80	194
October 19	do	333	270	.83	218
December 9	do	595	3,490	6.60	12,400
December 10	do	570	2,400	4.80	8,020
1909.					
January 5	H. G. Stokes	570	3,370	6.65	13,100
January 6	do	620	4,870	9.00	22,100

Daily gage height, in feet, of Black Warrior River near Coal, Ala., for 1908.

[Observer, A. P. Waldrop.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec
1	1.1	0.8	0.8	1.0	17	0.85	0.9	0.8	2.1
2	1.1	.8	.8	1.35	18	.8	.85	.8	2.0
3	1.0	.8	.8	1.5	19	.8	.85	.8	2.0
4	.9	.8	.8	1.4	20	.8	.85	.8	2.0
5	.9	.8	.9	1.3	21	.8	.85	.8	2.2
6	.9	.8	.9	1.3	22	.8	.85	.8	9.05
7	1.5	.8	.8	12.5	23	.8	.8	.8	12.0
8	1.95	.8	.8	13.5	24	.8	.8	.9	9.1
9	1.45	.8	.8	7.85	25	.8	.8	.9	6.75
10	1.15	.85	.8	4.6	26	.8	.8	.9	5.3
11	1.0	.9	.8	3.7	27	.8	.8	.9	4.5
12	1.0	.9	.8	2.95	28	.8	.8	.9	3.95
13	.95	.9	.8	2.9	29	.8	.8	.9	3.65
14	.9	.9	.8	2.8	30	.8	.8	.9	3.35
15	.9	.9	.8	2.55	31	.....	.75	.....	3.15
16	.9	.9	.8	2.25					

Rating table for Black Warrior River near Coal, Ala., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	90	2.10	1,910	3.50	4,530	5.80	10,280
.80	190	2.20	2,070	3.60	4,740	6.00	10,880
.90	295	2.30	2,230	3.70	4,960	6.20	11,510
1.00	405	2.40	2,400	3.80	5,180	6.40	12,170
1.10	520	2.50	2,570	3.90	5,400	6.60	12,850
1.20	640	2.60	2,750	4.00	5,630	6.80	13,550
1.30	765	2.70	2,930	4.20	6,090	7.00	14,270
1.40	895	2.80	3,120	4.40	6,570	8.00	18,070
1.50	1,030	2.90	3,310	4.60	7,060	9.00	22,100
1.60	1,170	3.00	3,500	4.80	7,560	10.00	26,200
1.70	1,310	3.10	3,700	5.00	8,070	11.00	30,400
1.80	1,450	3.20	3,900	5.20	8,600	12.00	34,700
1.90	1,600	3.30	4,110	5.40	9,140	13.00	39,100
2.00	1,750	3.40	4,320	5.60	9,700	14.00	43,600

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on eight discharge measurements made during 1908 and 1909 and is well defined.

Monthly discharge of Black Warrior River near Coal, Ala., for 1908.

[Drainage area, 3,560 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
September	1,680	190	378	0.106	0.12	A.
October	295	140	222	.062	.07	A.
November	295	190	222	.062	.07	A.
December	41,400	405	8,500	2.39	2.76	A.

MISCELLANEOUS MEASUREMENTS IN MOBILE RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in Mobile River drainage basin during 1907 and 1908:

Miscellaneous measurements in Mobile basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1907.				*Feet.*	*Sec.-ft.*
August 16	Conasauga River	Oostanaula River	At wagon bridge 1/4 mile west of Alaculsey, Ga.	0.95	26
Do	Jack River	Conasauga River	1 mile below Alaculsey, Ga.	1.73	32
May 16	Long Swamp Creek.	Etowah River	At wagon bridge near mouth of creek, Ball Ground, Ga.	1.97	179
June 22	Little River	do	Hawkins Bridge, Woodstock, Ga.	1.22	102
1908.					
October 23	Tombigbee River	Mobile River	At Frisco System railroad bridge, Bigbee, Miss.	4.23	132
October 2 [a]	Locust Fork, Black Warrior River.	Black Warrior River.	Gaging station at Palos, Ala.	.05	44
October 12 [a]	do	do	do	.15	90
November 25 [a]	do	do	do	.20	61

[a] Measurement by H. G. Stokes.

RIVER SURVEYS AND WATER POWER.

Surveys have been made in the Mobile drainage basin as follows:

Etowah River from Rome to mouth of Little River, Georgia.[a]

Coosawattee River from Carters to Ellijay, Ga.[a]

Big Sandy Creek from mouth to the new bridge near Dadeville, Ala.[b]

Coosa River from Wetumpka to Greensport, Ala.[b]

Cahaba River from mouth to the Shelby County line.[b]

Black Warrior River from Tuscaloosa, Ala., to the mouth of Mulberry Fork.[b]

In order to point out the power possibilities along Tallapoosa River, a profile has been published by the United States Geological Survey showing the fall between Tallapoosa, Ga., and Matilda, Ala., with notes on tributary streams and other prominent natural and artificial features along the river.[c]

[a] Elevations taken on these surveys and brief statements regarding possible power development are given in Water resources of Georgia: Water-Supply Paper U. S. Geol. Survey No. 197.

[b] Surveys made, elevations taken, and information regarding water power are given in Water powers of Alabama: Water-Supply Paper U. S. Geol. Survey No. 107.

[c] Sheets showing this profile may be obtained upon application to the Director of the Geological Survey. Elevations from Milstead, Ala., to Griffin Shoals, near Matilda, Ala., are contained in Water powers of Alabama (Water-Supply Paper 107), together with information regarding water-power development.

PASCAGOULA RIVER DRAINAGE BASIN.

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in Pascagoula River drainage basin during 1908:

Miscellaneous measurements in Pascagoula Basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
March 21	Pascagoula River.	Gulf of Mexico	M., J. & K. C. R. R. bridge, Merrill, Miss.	[a] 6.40	5,920
March 24	Chickasawhay River.	Pascagoula River.	At wagon bridge, Shubuta, Miss.	[a] 20.50	7,790
March 20	Leaf River	do	N. O. & N. E. R. R. bridge, ½ mile from Hattiesburg, Miss.	[a] 4.30	1,410

[a] United States Weather Bureau gage.

PEARL RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Pearl River drains the south central part of Mississippi. It rises near the center of the State and flows south into Lake Borgne, an arm of the Gulf of Mexico.

The following gaging stations have been maintained in this river basin:

Pearl River, Jackson, Miss., 1901–1908.
Bogue Chitto, Warnerton, La., 1906.

PEARL RIVER AT JACKSON, MISS.

The station is located at Jackson, Miss., one-eighth mile above the Alabama and Vicksburg Railway bridge and two blocks east from the end of the South State street car line. It was established June 24, 1901.

The datum of the chain gage has remained the same since the establishment of the station. The right bank is high and does not overflow. The left bank is of cleared ground and overflows for several hundred feet at a stage of about 20 feet. The bed of the stream is shifting, necessitating frequent measurements at low stages. A fair rating has been developed for 1907 and 1908.[a]

Discharge measurements of Pearl River at Jackson, Miss., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907.					
October 24	Warren E. Hall	80	282	0.98	192
1908.					
March 18	Warren E. Hall	138	903	5.63	2,030
July 27	do	114	492	2.40	629

[a] Data collected at this station prior to 1904 have been compiled in Water-Supply Paper No. 107, Water powers of Alabama.

Daily gage height, in feet, of Pearl River at Jackson, Miss., for 1907 and 1908.

[Observer, J. B. Flowers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept	Oct.	Nov.	Dec.
1907.												
1	7.3	5.1	18.0	4.0	9.6	8.8	2.9	1.8	2.0	1.0	0.8	5.0
2	8.7	7.4	21.0	3.6	11.0	7.6	3.0	1.8	2.0	1.0	.8	4.7
3	9.7	10.2	23.3	3.6	10.3	7.3	2.9	2.0	1.9	.9	.8	3.6
4	9.9	12.0	24.7	3.3	10.9	6.7	2.9	2.1	1.7	.9	.8	3.3
5	10.2	16.4	25.7	3.3	12.1	6.3	3.4	2.1	1.7	1.0	.8	3.1
6	10.4	17.6	26.3	3.3	13.2	6.1	3.9	2.0	1.5	1.0	.7	3.0
7	10.5	18.7	26.9	3.3	14.4	6.0	3.8	2.2	1.6	.9	.7	2.9
8	10.6	19.3	27.2	3.3	16.1	5.7	3.9	2.1	1.5	1.0	.7	2.7
9	10.7	19.5	27.2	3.4	18.8	4.8	3.7	1.8	1.5	1.1	1.0	2.8
10	10.5	19.4	26.1	3.5	19.6	4.7	3.2	1.6	1.5	1.0	1.0	2.9
11	10.0	19.2	25.8	3.7	20.0	4.3	2.9	1.6	1.7	1.0	1.0	2.9
12	9.4	18.9	25.8	3.9	20.7	4.2	3.1	1.7	2.1	1.4	1.0	2.8
13	8.5	18.5	24.9	4.1	21.0	3.9	2.9	1.8	2.9	1.7	.9	2.8
14	7.8	18.0	23.7	4.0	21.1	4.0	3.3	1.6	3.0	1.8	.9	4.6
15	7.3	17.1	22.2	3.7	22.5	4.0	2.8	1.8	2.7	1.7	.9	4.6
16	6.8	16.0	20.3	3.4	23.3	4.0	3.0	2.0	2.2	1.5	.9	4.6
17	6.2	14.3	17.8	4.0	23.3	4.1	3.1	2.1	1.9	1.4	1.0	4.1
18	5.8	12.6	14.3	4.4	22.9	3.7	3.0	2.0	1.6	1.3	1.0	4.2
19	5.2	10.5	11.3	6.1	21.8	3.3	2.5	2.1	1.4	1.2	1.0	4.4
20	4.7	9.0	9.6	7.2	20.9	3.1	2.3	2.3	1.3	1.0	1.0	3.7
21	4.7	7.9	8.3	8.0	19.8	3.9	2.3	2.3	1.2	1.0	.9	3.6
22	4.4	6.9	7.2	8.5	19.1	3.0	2.2	2.2	1.2	1.0	1.5	3.6
23	4.5	6.1	7.1	8.4	18.6	2.8	2.0	2.2	1.1	1.0	2.6	3.6
24	4.5	6.8	6.9	8.5	16.9	2.7	1.8	2.4	1.1	1.0	3.4	3.5
25	4.3	6.5	6.3	8.6	16.3	2.6	1.5	2.2	.9	.9	3.1	3.4
26	4.1	8.8	5.8	8.3	15.3	2.5	1.6	2.3	.9	.9	4.7	3.4
27	3.9	11.0	5.6	7.9	15.1	2.3	1.5	2.6	1.1	.9	4.7	3.3
28	3.8	13.0	5.1	7.8	14.3	2.8	1.7	2.8	1.1	.9	5.0	3.3
29	3.7	.....	5.1	7.6	12.5	2.5	2.3	3.0	1.0	.9	5.5	3.3
30	3.6	.....	4.6	7.4	10.5	2.9	2.8	3.1	1.0	.8	5.7	6.4
31	3.5	.....	4.5	.....	9.7	.....	2.1	2.7	.....	.8	.....	7.8
1908.												
1	7.9	10.1	26.2	27.8	18.2	13.3	2.9	2.7	3.4	1.5	.3	1.1
2	8.3	11.4	24.9	27.9	17.2	11.2	2.6	4.7	3.3	1.5	.3	1.1
3	8.3	12.4	23.8	27.0	16.0	8.8	2.3	6.8	2.7	1.3	.4	1.0
4	8.3	13.2	22.3	26.1	14.6	7.9	2.1	10.0	2.5	1.3	.5	1.0
5	8.2	12.9	20.4	25.1	16.3	6.6	2.4	12.9	2.3	1.2	.5	.9
6	7.9	13.0	19.4	24.0	25.2	5.6	2.6	15.8	2.1	1.0	.5	1.5
7	7.7	13.7	17.5	22.3	28.2	4.9	2.5	18.0	2.1	1.0	.4	2.1
8	7.6	14.1	15.4	19.8	28.6	4.5	2.5	19.8	2.0	1.0	.4	2.4
9	7.4	14.3	11.4	16.0	28.0	4.4	2.6	21.0	1.8	1.0	.4	2.3
10	7.1	16.6	9.2	11.9	27.7	4.7	2.6	21.6	1.6	1.0	.5	3.4
11	9.9	17.8	8.6	9.1	26.8	4.8	2.8	21.0	1.6	1.0	.5	4.1
12	11.8	18.1	8.0	8.1	26.7	4.7	3.0	19.2	1.5	1.0	.5	4.5
13	12.3	21.4	7.5	7.7	26.4	5.5	3.4	15.3	1.5	1.0	.5	4.6
14	12.6	23.1	7.1	7.1	26.2	5.7	3.6	10.0	1.4	.8	.6	4.5
15	12.6	24.5	6.9	6.5	26.0	6.1	3.6	6.5	1.4	.7	.5	4.0
16	11.6	25.1	6.5	6.9	26.2	6.0	3.4	5.4	1.4	.6	.5	3.6
17	11.4	25.5	6.4	7.8	25.8	6.0	3.0	4.7	1.4	.6	.4	3.4
18	10.9	26.0	5.8	8.4	25.1	6.8	2.9	4.2	1.2	.6	.6	3.3
19	9.7	27.0	5.6	8.7	24.8	7.4	2.8	4.3	1.2	.5	.6	3.3
20	9.1	27.8	5.2	9.2	24.5	7.4	2.7	5.3	1.2	.4	.5	3.3
21	8.9	28.6	5.0	10.8	24.3	6.9	2.4	4.7	1.2	.4	.5	3.4
22	8.1	29.4	4.9	12.1	24.7	6.2	2.3	4.7	1.2	.6	.5	3.5
23	7.0	29.8	13.0	13.8	24.9	5.6	2.0	4.6	1.1	.6	.4	4.0
24	5.9	29.7	18.7	15.1	24.8	5.3	1.9	4.6	1.1	.5	.5	3.3
25	5.1	29.7	21.3	18.3	24.6	5.1	2.7	4.1	1.1	.4	.5	4.5
26	5.1	29.3	23.7	20.0	24.0	4.9	2.8	4.0	1.3	.4	.8	4.9
27	5.1	28.9	24.0	20.4	23.3	4.8	2.5	5.3	1.7	.6	.9	5.5
28	4.9	27.9	24.9	20.6	22.2	4.5	2.3	4.8	1.9	.5	.9	5.7
29	4.8	27.1	26.0	20.3	20.8	3.3	2.5	4.3	1.8	.5	.9	5.8
30	4.8	.....	26.8	19.4	19.0	3.2	2.3	3.8	1.8	.4	.9	5.9
31	5.1	.....	27.5	.....	16.3	.....	2.6	3.7	.....	.4	.....	5.0

Rating table for Pearl River at Jackson, Miss., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.30	100	2.20	555	4.20	1,405	12.00	5,935
.40	110	2.30	590	4.40	1,495	13.00	6,600
.50	120	2.40	630	4.60	1,585	14.00	7,300
.60	130	2.50	670	4.80	1,675	15.00	8,000
.70	145	2.60	710	5.00	1,770	16.00	8,700
.80	160	2.70	750	5.20	1,870	17.00	9,500
.90	180	2.80	790	5.40	1,980	18.00	10,300
1.00	200	2.90	830	5.60	2,090	19.00	11,100
1.10	220	3.00	870	5.80	2,200	20.00	12,000
1.20	240	3.10	910	6.00	2,310	21.00	12,900
1.30	265	3.20	955	6.20	2,420	22.00	13,900
1.40	290	3.30	1,000	6.40	2,530	23.00	15,000
1.50	320	3.40	1,045	6.60	2,640	24.00	16,200
1.60	350	3.50	1,090	6.80	2,750	25.00	17,500
1.70	380	3.60	1,135	7.00	2,860	26.00	19,000
1.80	415	3.70	1,180	8.00	3,435	27.00	20,700
1.90	450	3.80	1,225	9.00	4,035	28.00	22,600
2.00	485	3.90	1,270	10.00	4,635	29.00	24,500
2.10	520	4.00	1,315	11.00	5,285	30.00	26,400

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on two discharge measurements made during 1907–8 below gage height 4 feet and the form of previous curves. Above gage height 4 feet it is based on eight measurements. It is fairly well defined.

Monthly discharge of Pearl River at Jackson, Miss., for 1907 and 1908.

[Drainage area, 3,120 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	5,090	1,090	2,920	0.936	1.08	A.
February	11,600	1,820	6,930	2.22	2.31	B.
March	21,100	1,540	10,500	3.37	3.88	C.
April	3,800	1,000	2,040	.654	.73	A.
May	15,400	4,400	9,680	3.10	3.57	C.
June	3,920	590	1,530	.490	.55	A.
July	1,270	320	770	.247	.28	B.
August	910	350	539	.173	.20	B
September	870	180	373	.120	.13	B.
October	415	160	225	.072	.08	B.
November	2,140	145	531	.170	.19	B.
December	3,320	750	1,240	.397	.46	B.
The year	21,100	145	3,110	.996	13.46	
1908.						
January	6,320	1,680	3,640	1.17	1.35	A.
February	26,000	4,700	15,500	4.97	5.36	C.
March	21,600	1,720	9,380	3.01	3.47	C.
April	22,400	2,580	9,690	3.11	3.47	C.
May	23,700	7,720	16,300	5.22	6.02	C.
June	6,810	955	2,400	.769	.86	A.
July	1,140	450	740	.237	.27	B.
August	13,500	750	4,450	1.43	1.65	A.
September	1,040	220	409	.131	.15	B.
October	320	110	169	.054	.06	B.
November	180	100	127	.041	.05	C.
December	2,260	180	1,120	.359	.41	B.
The year	26,000	100	5,330	1.71	23.12	

NOTE.—Under certain conditions backwater due to gorging takes place at this station above about a 15-foot stage.

BOGUE CHITTO AT WARNERTON, LA.

This station was established April 28, 1906, and was discontinued July 31, 1906.

For gage heights covering this period and one discharge measurement see previous publications.[a]

MISCELLANEOUS MEASUREMENT IN PEARL RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurement was made in Pearl River drainage basin, March 19, 1908:

Pearl River, at wagon bridge, 2 miles below Columbia, Miss.: Gage height, 8.15 feet; discharge, 4,810 second-feet.

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[a] Water-Supply Paper No. 204.

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O

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 243

SURFACE WATER SUPPLY OF THE UNITED STATES

1907-8

PART III. OHIO RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

A. H. HORTON, M. R. HALL, AND
R. H. BOLSTER

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SURFACE WATER SUPPLY OF THE OHIO RIVER BASIN, 1907–8.

By A. H. Horton, M. R. Hall, and R. H. Bolster.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of flow measurements made on certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with organizations mentioned herein. These investigations are authorized by the organic law of the Geological Survey (Stat. L., vol. 20, p. 394), which provides, among other things, as follows:

> Provided that this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

Inasmuch as water is the most abundant and most valuable mineral in nature, the investigation of water resources is included under the above provision for investigating mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the river systems or parts thereof that might purposefully be studied. The scope of the work is limited to that which can be provided with the appropriations available. The field covered and the character of the work are believed to be the best that could be accomplished under the controlling conditions. It would undoubtedly be of more scientific importance and ultimately of more practical value if the money now applied to wide areas were concentrated on a few small basins. Such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be maintained during a period of years sufficient to cover all stages, in order that within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum may be determined. The length of such a period manifestly varies for different streams and can not be absolutely determined. Experience has shown that the records should cover from five to ten years, or for some streams twenty years or more, the limit being determined by the relative importance of the stream and the interdependence of the results and other long-time records on adjacent streams.

In the performance of this work the Geological Survey endeavors to approach as nearly as possible the highest degree of precision which a rational expenditure of time and a judicious expenditure of a small amount of money will allow. In all engineering work there is a point of refinement beyond which it is needless and wasteful to proceed, and this principle applies with especial force to stream-flow measurements. It is confidently believed that with some unavoidable exceptions the stream-flow data presented in the publications of the Survey are sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of many stations. All persons are cautioned to exercise the greatest care in the utilization of such incomplete records.

Records of varying lengths have been obtained at about 1,400 different points in the United States, and in addition the surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, has been investigated. During 1907 and 1908 regular gaging stations were maintained by the Survey and cooperating organizations at about 740 points in the United States, and in addition numerous miscellaneous measurements were made. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country.

These data will be made available in the regular surface water-supply papers and in special papers from time to time.

PURPOSES OF THE WORK.

Among the purposes for which the results contained in this volume are requisite are navigation, irrigation, domestic water supply, water power, swamp and overflow land drainage, and flood prevention. The demands of all these interests are immediate.

Navigation.—The Federal Government has expended more than $250,000,000 for the improvement of inland navigation and prospective expenditures will approximate several times this amount. It is obvious that the determination of stream flow is necessary to the intelligent solution of the many problems involved.

Irrigation.—The United States is now expending $42,000,000 on federal irrigation systems, and this amount is far exceeded by the private expenditures of this nature in the arid West. The integrity of any irrigation system is based absolutely on the amount of water available. Therefore investigations of stream flow in that portion of the country are of first importance in the redemption of the lands, as well as constituting an insurance of federal and private investments.

Domestic water supply.—The highest use of water is that of domestic supply, and while the federal interest in this aspect of the matter is less direct than in the aspects already named this use of water nevertheless has so broad a significance with respect to the general welfare that the Federal Government is ultimately and intimately concerned.

Water power.—The time is rapidly approaching when the development of the water power of the country will be an economic necessity. Our stock of coal is being rapidly depleted and the cost of steam power is increasing accordingly. Industry will cease its growth if cheap power is not available, and in that event the United States as a nation will cease to progress. Water power is the only avenue now open. When the electric transmission of power was accomplished, the relation of our water powers to national economy changed entirely. Previous to the day of electric transmission the importance of a water power was largely confined to the locality at which it was generated, but it has now become a public utility in which the individual citizen is vitally interested. Inasmuch as the amount of water power that may be made available is dependent on the flow of rivers, the investigation of flow becomes a prerequisite in the judicious management of this source of energy.

Drainage of swamp and overflowed lands.—More than 70,000,000 acres of the richest land in this country are now practically worthless, or of precarious value, by reason of overflow and swamp con-

ditions. When this land is drained it becomes exceedingly productive and its value increases many fold. Such reclamation would add to the national assets at least $700,000,000. The study of run-off is the first consideration in connection with drainage projects. If by the drainage of a large area into any particular channel that channel becomes so gorged with water which it had not hitherto been called upon to convey that overflow conditions are created in places where previously the land was not subject to inundation, then drainage results merely in an exchange of land values. This is not the purpose of drainage improvement.

Flood prevention.—The damage from floods in the United States exceeds $100,000,000 annually and in the year 1908 the aggregate damage, based on reliable data, approximated $250,000,000. Such an annual tax on the property of great regions should be reduced in the orderly progress of government. It goes without saying that any consideration of flood prevention must be based on a thorough knowledge of stream flow, both in the contributing areas which furnish the water and along the great lowland rivers.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey since its inception have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications has varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1907 and 1908. The dividing line between the North Atlantic and South Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1907–8.

Part.	No.	Title.	Part.	No.	Title.
I	241	North Atlantic coast.	VI	246	Missouri River basin.
II	242	South Atlantic coast and eastern Gulf of Mexico.	VII	247	Lower Mississippi River basin.
III	243	Ohio River basin.	VIII	248	Western Gulf of Mexico.
IV	244	St. Lawrence River basin.	IX	249	Colorado River basin.
V	245	Upper Mississippi River and Hudson Bay basin.	X	250	Great Basin.
			XI	251	California.
			XII	252	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey exclusive of all special papers. Numbers of reports are inclusive and dates also are inclusive so far as the data are available.

Stream-flow data in reports of the United States Geological Survey.

[Ann.=Annual Report; B.=Bulletin; W. S.=Water-Supply Paper.]

Report.	Character of data.	Year.
10th Ann., pt. 2	Descriptive information only	
11th Ann., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th Ann., pt. 2	do	1884 to June 30, 1891.
13th Ann., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th Ann., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th Ann., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W. S. 11	Gage heights (also gage heights for earlier years)	1896.
18th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896.
W. S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W. S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W. S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W. S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th Ann., pt. 4	Monthly discharge (also for many earlier years)	1898.
W. S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st Ann., pt. 4	Monthly discharge	1899.
W. S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d Ann., pt. 4	Monthly discharge	1900.
W. S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W. S. 75	Monthly discharge	1901.
W. S. 82 to 85	Complete data	1902.
W. S. 97 to 100	do	1903.
W. S. 124 to 135	do	1904.
W. S. 165 to 178	do	1905.
W. S. 201 to 214	Complete data, except descriptions	1906.
W. S. 241 to 252	Complete data	1907–8.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119. The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1908. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1908.

	1899.[a]	1900.[b]	1901.	1902.	1903.	1904.	1905.	1906.	1907–8.
Atlantic coast and eastern Gulf of Mexico:									
New England rivers	35	47	65, 75	82	97	124	165	201	241
Hudson River to Delaware River, inclusive	35	47, (48)	65, 75	82	97	125	166	202	241
Susquehanna River to York River, inclusive	35	48	65, 75	82	97	126	167	203	241
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98	126	167	203	242
Santee River to Pearl River, inclusive	36	48	65, 75	83	98	127	168	204	242
St. Lawrence River	36	49	65, 75	(82), 83	97	129	170	206	244
Hudson Bay	.....	.....	66, 75	85	100	130	171	207	245
Mississippi River:									
Ohio River	36	48, (49)	65, 75	83	98	128	169	205	243
Upper Mississippi River	36	49	65, 75	83	98, (99)	128, (130)	171	207	245
Missouri River	(36), 37	49, (50)	66, 75	84	99	130, (131)	172	208	246
Lower Mississippi River	37	50	(65), 66, 75	(83), 84	(98), 99	(128), 131	(169), 173	(205), 209	247
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248
Pacific coast and Great Basin:									
Colorado River	(37), 38	50	66, 75	85	100	133, (134)	175, (177)	211 (213)	249, (251)
Great Basin	38, (39)	51	66, 75	85	100	133, (134)	176, (177)	212, (213)	250, (251)
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100	134	177	213	251
North Pacific coast	38	51	66, 75	85	100	135	(177) 178	214	252

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	All stations in Colorado and Great Basin drainages lying in California repeated.
	Great Basin	

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined on the

basis of drainage area, local changes in name and lake surface being disregarded. After all stations from the source to the mouth of the main stem of the river have been given, the tributaries are taken up in regular order from source to mouth. The tributaries are treated the same as the main stream, all stations in each tributary basin being given before taking up the next one below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is often clearer to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Gallons per minute" is generally used in connection with pumping and city water supply.

The "miner's inch" is the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It is commonly used by miners and irrigators throughout the West and is defined by statute in each State in which it is used.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of March 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equal 18.7 United States gallons per second.
100 California miner's inches equal 96.0 Colorado miner's inches.
100 California miner's inches for one day equal 4.96 acre-feet.
100 Colorado miner's inches equal 2.60 second-feet.
100 Colorado miner's inches equal 19.5 United States gallons per second.
100 Colorado miner's inches equal 104 California miner's inches.
100 Colorado miner's inches for one day equal 5.17 acre-feet.
100 United States gallons per minute equal 0.223 second-feet.
100 United States gallons per minute for one day equal 0.442 acre-foot.
1,000,000 United States gallons per day equal 1.55 second-feet.
1,000,000 United States gallons equal 3.07 acre-feet.
1,000,000 cubic feet equal 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on one square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.

$1\frac{1}{3}$ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF TABLES.

For each drainage basin there is given a brief description of general conditions covering such features as area, source, tributaries, topography, geology, conditions of forestation, rainfall, ice conditions, irrigation, storage, power possibilities, and other special features of importance or interest.

For each regular current-meter gaging station are given in general, and so far as available, the following data: Description of station, list of discharge measurements, table of daily gage heights, rating table, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height and rating tables are omitted and a table of daily discharge is substituted. For stations where the flow is computed by shifting-channel methods, a table of daily discharge is given in place of rating tables, which are not used in these methods of computation.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting conditions of flow, and backwater; also full information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights gives the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights during ice conditions, backwater from obstructions, etc., are published as recorded, with suitable footnotes. The rating is not applicable for such periods unless the proper correction to the gage heights is known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which the rating tables and monthly-discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is published to enable engineers to determine the daily discharge by its application to the table of gage heights or to check results in the table of monthly discharge.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the period when the water surface was at crest height and the corresponding discharge consequently larger than given in this column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 13, are based.

FIELD METHODS OF MEASURING STREAM FLOW.

There are three distinct methods of determining the flow of open-channel streams: (1) By measurements of slope and cross section and the use of Chezy's and Kutter's formulas; (2) by means of a weir or dam; (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen depends on the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

Slope method.—Much information has been collected relative to the coefficients to be used in the Chezy formula, $v=c\sqrt{Rs}$. This has been utilized by Kutter, both in developing his formula for c and in determining the values of the coefficient n which appears therein. The results obtained by the slope method are in general only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value for n to be used in Kutter's formula. The most common use of this method is in estimating the flood discharge of a stream when the only data available are the cross section, the slope as shown by marks along the bank, and a knowledge of the general conditions. It is seldom used by the United States Geological Survey. For full information regarding this method the reader is referred to the various text-books on hydraulics.

Weir method.—Relatively few stations are maintained at weirs or dams by the United States Geological Survey. Standard types of

sharp-crested and broad-crested weirs within the limits for which accurate coefficients have been experimentally obtained give very accurate records of discharge if properly maintained. At practically all broad-crested weirs, however, there is a diversion of water either through or around the dam, usually for the purpose of development of water power. The flow is often complicated and the records are subject to errors from such sources as leakage through the dam, backwater at high stages, uncertainty regarding coefficient, crest which is not level, obstructions from logs or ice, use of flashboards, old turbines with imperfect ratings, and many others depending on the type of development and the uses of the diverted water.

In general, records of discharge at dams are usually accurate enough for practical use if no others are available. It has been the general experience of the United States Geological Survey, however, that records at current meter gaging stations under unobstructed channel conditions are more accurate than those collected at dams, and where the conditions are reasonably favorable are practically as good as those obtained at sharp-crested weirs.

The determination of discharge over the different types of weirs and dams is treated fully in "Weir experiments, coefficients, and formulas" (Water-Supply Paper 200[a]) and in the various text-books on hydraulics. "Turbine water-wheel tests and power tables" (Water-Supply Paper 180) treats of the discharge through turbines when used as meters. The editions of both of these water-supply papers are practically exhausted. They can, however, be consulted at most of the larger libraries of the country or they can be obtained from the Superintendent of Documents, Washington, D. C., at a cost of 20 cents for No. 180 and 35 cents for No. 200. Remittances must be made by postal money order, express order, or New York draft.

Velocity method.—Streams in general present throughout their courses to a greater or less extent all conditions of permanent, semi-permanent, and varying conditions of flow. In accordance with the location of the measuring section with respect to these physical conditions, current-meter gaging stations may in general be divided into four classes—(1) those with permanent conditions of flow; (2) those with beds which change only during extreme high water; (3) those with beds which change frequently but which do not cause a variation of more than about 5 per cent of the discharge curves from year to year; and (4) those with constantly shifting beds. In determining the daily flow different office methods are necessary for each class. The field data on which the determinations are based and the methods of collecting them are, however, in general the same.

[a] Water-Supply Paper 200 is a revision of No. 150, the edition of which is exhausted.

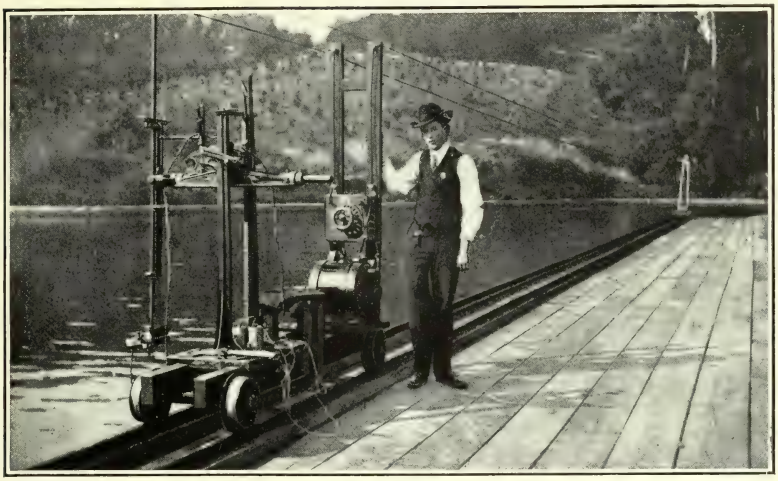
Great care is taken in the selection and equipment of gaging stations for determining discharge by velocity measurements, in order that the data may have the required degree of accuracy. They are located, as far as possible, at such points that the relation between gage height and discharge will always remain constant for any given stage. The experience of engineers of the Geological Survey has been that permanency of conditions of flow is the prime requisite of any current-meter gaging station when maintained for several years unless funds are available to cover all changes in conditions of flow. A straight, smooth section without cross currents, backwater, boils, etc., at any stage is highly desirable, but on most streams is not attainable except at the cost of a cable equipment. Rough, permanent sections, if measurements are properly made by experienced engineers, taking measuring points at a distance apart of 2 to 5 per cent or less of the total width, will within reasonable limits yield better results for a given outlay of money than semi-permanent or shifting sections with smooth, uniform current. So far as possible stations are located where the banks are high and not subject to overflow at high stages and out of the influence of tributary streams, dams, or other artificial obstructions which might affect the relation between gage height and discharge.

A gaging station consists essentially of a gage for determining the daily fluctuations of stage of the river and some structure or apparatus from which discharge measurements are made, usually a bridge or cable.

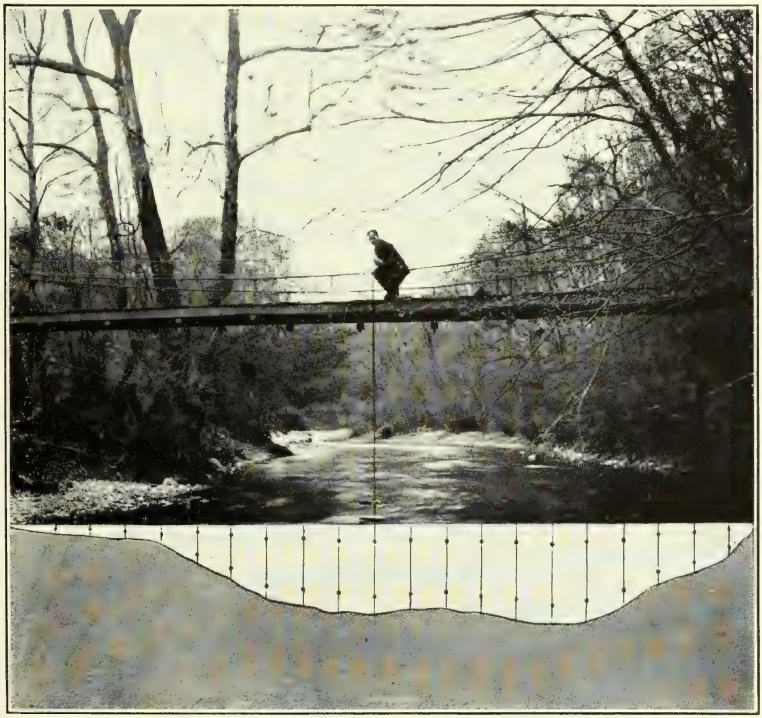
The two factors required to determine the discharge of a stream past a section perpendicular to the mean direction of the current are the area of the cross section and the mean velocity of flow normal to that section.

In making a measurement with a current meter a number of points, called measuring points, are measured off above and in the plane of the measuring section at which observations of depth and velocity are taken. (See Pl. I, *B*.) These points are spaced equally for those parts of the section where the flow is uniform and smooth and are spaced unequally for other parts according to the discretion and judgment of the engineer. In general the points should not be spaced farther apart than 5 per cent of the distance between piers, nor farther apart than the approximate mean depth of the section at the time of measurement.

The measuring points divide the total cross section into elementary strips at each end of which observations of depth and velocity are made. The discharge of any elementary strip is the product of the average of the depths at the two ends times the width of the strip times the average of the mean velocities at the two ends of the strip. The sum of the discharges of the elementary strips is the total



A. CURRENT-METER RATING STATION AT LOS ANGELES, CAL.



B. BRIDGE STATION AND CROSS SECTION OF STREAM.

Illustrating 0.2 and 0.8 depth method.

discharge of the stream. (For a discussion of methods of computing the discharge of a stream see Engineering News, June 25, 1908.)

Depths for the determination of the area are usually obtained by sounding with the current meter and cable. In rough sections or swift current an ordinary weight and cable are used, particular care being taken that all observations shall be in the plane of the cross section.

Two methods of determining the velocity of flow of a stream are in general use—the float method and the current-meter method.

The float method with its various modifications of surface, subsurface, and tube or rod floats is now considered obsolete in the ordinary practice of the United States Geological Survey. The use of this method is limited to special conditions where it is impracticable to use the current meter, such as in places where large quantities of ice or débris which may damage the meter are flowing with the current, and for miscellaneous measurements or other work where a high degree of accuracy is not necessary. Tube floats are very satisfactory for use in canals with regular bottoms and even flow of current. Measurements by the float method are made as follows: The velocity of flow of the stream is obtained by observing the time which it takes floats set free at different points across the stream to pass between two range lines about 200 feet apart. The area used is the mean value obtained from several cross sections measured between the two range lines. The chief disadvantages of this method are difficulty in obtaining the correct value of mean area for the course used and uncertainty regarding the proper coefficient to apply to the observed velocity. For further information regarding this method the reader is referred to Water-Supply Paper 95 and to the various text-books covering the general subject of stream flow.

The Price current meter is now used almost to the exclusion of other types of meters by the United States Geological Survey in the determination of the velocity of flow of water in open channels, a use for which it is adapted under practically all conditions. Plate II shows in the center the new type of penta-recording current meter equipped for measurements at bridge and cable stations. On the sides of the same type of meter is shown equipped for wading measurements to record by the acoustic method on the left and by the electric method on the right. Briefly, the meter consists of six cups attached to a vertical shaft which revolves on a conical hardened steel point when immersed in moving water. The number of revolutions is indicated electrically. The rating, or relation between the velocity of the moving water and the revolutions of the wheel, is determined for each meter by drawing it through still water for a given distance at different speeds and noting the number of revolutions for each run. (See Pl. I, *A*.) From these data a rating table is prepared

which gives the velocity per second of moving water for any number of revolutions in a given time interval. The ratio of revolutions per second to velocity of flow in feet per second is very nearly a constant for all speeds and is approximately 0.45.

Three classes of methods of measuring velocity with current meters are in general use—multiple-point, single-point, and integration.

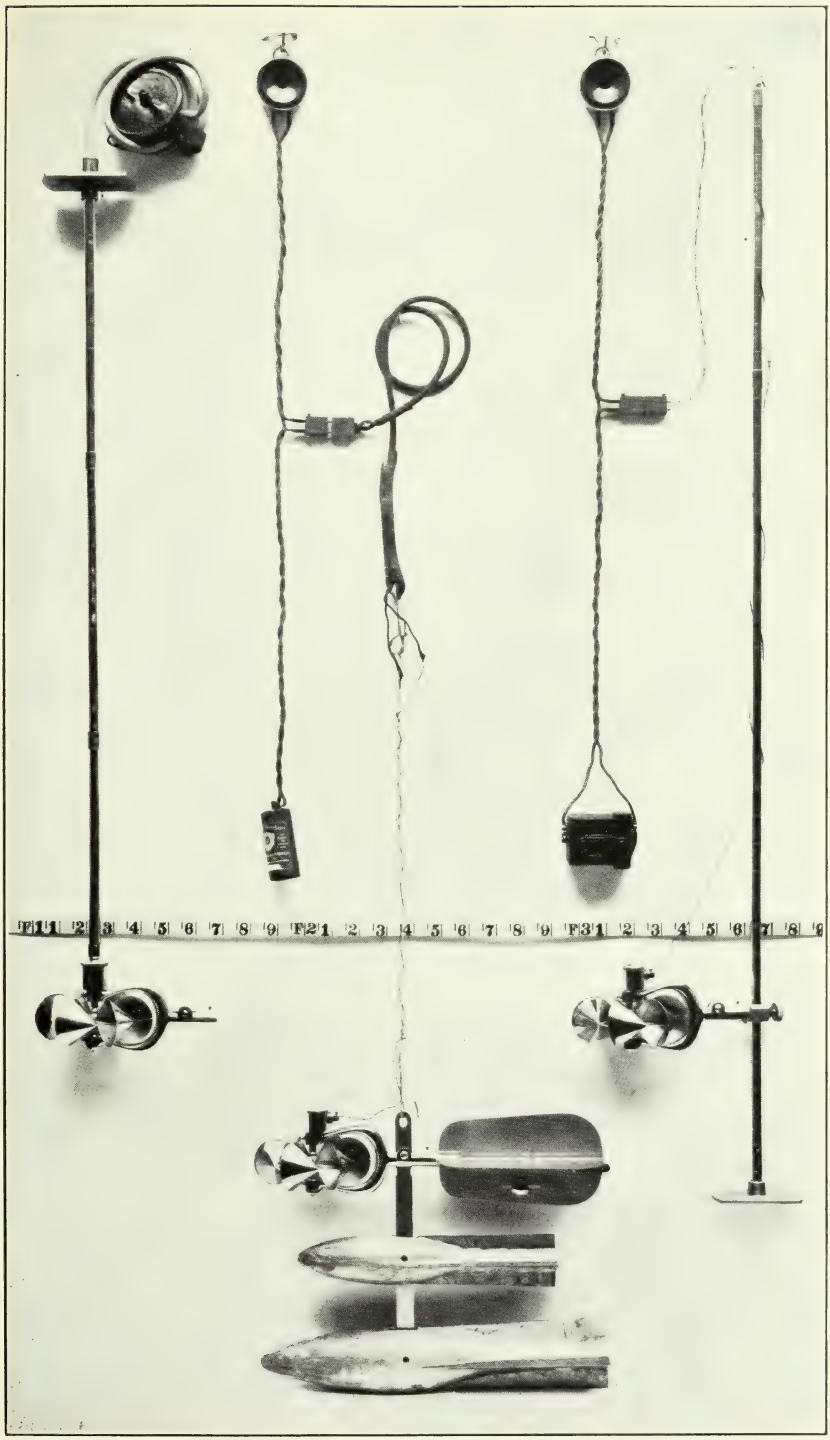
The two principal multiple-point methods in general use are the vertical velocity curve and 0.2 and 0.8 depth.

In the vertical velocity curve method a series of velocity determinations are made in each vertical at regular intervals, usually about 10 to 20 per cent of the depth apart. By plotting these velocities as abscissas and their depths as ordinates and drawing a smooth curve among the resulting points, the vertical velocity curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the area bounded by this velocity curve and its axis by the depth. This method of obtaining the mean velocity in the vertical is probably the best known, but on account of the length of time required to make a complete measurement its use is largely limited to the determination of coefficients for purposes of comparison and to measurements under ice.

In the second multiple-point method the meter is held successively at 0.2 and 0.8 depth, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. (See Pl. I, *B*.) On the assumption that the vertical velocity curve is a common parabola with horizontal axis, the mean of the velocities at 0.22 and 0.79 depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this multiple-point method gives the mean velocity very closely for open-water conditions and that in a completed measurement it seldom varies as much as 1 per cent from the value given by the vertical velocity curve method. Moreover, the indications are that it holds nearly as well for ice-covered rivers. It is very extensively used in the regular practice of the United States Geological Survey.

The single-point method consists in holding the meter either at the depth of the thread of mean velocity or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined or must be assumed.

Extensive experiments by means of vertical velocity curves show that the thread of mean velocity generally occurs between 0.5 and 0.7 total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and at this point the meter is held in most of the measurements made by the single-point method. A large number of vertical velocity curve measurements, taken on many streams and under varying conditions, show that the average



PRICE PENTA-RECORDING CURRENT METERS.

coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity. The variation of the coefficient from unity in individual cases is, however, greater that in the 0.2 and 0.8 method and the general results are not as satisfactory.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocity taken at the subsurface to the mean has been found to be in general from about 0.85 to 0.95, depending on the stage, velocity, and channel conditions. The higher the stage the larger the coefficient. This method is especially adapted for flood measurements, or when the velocity is so great that the meter can not be kept in the correct position for the other methods.

The vertical integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is useful as a check on the point methods. In using the Price meter great care should be taken that the vertical movement of the meter is not rapid enough to vitiate the accuracy of the resulting velocity.

The determination of the flow of an ice-covered stream is difficult, owing to diversity and instability of conditions during the winter period and also to lack of definite information in regard to the laws of flow of water under ice. The method now employed is to make frequent discharge measurements during the frozen periods by the 0.2 and 0.8 and the vertical velocity curve methods, and to keep an accurate record of the conditions, such as the gage height to the surface of the water as it rises in a hole cut in the ice, and the thickness and character of the ice. From these data an approximate estimate of the daily flow can be made by constructing a rating curve (really a series of curves) similar to that used for open channels, but considering, in addition to gage heights and discharge, the varying thickness of ice. For information in regard to flow under ice cover, see Water-Supply Paper 187.

OFFICE METHODS OF COMPUTING AND STUDYING DISCHARGE AND RUN-OFF.

At the end of each year the field or base data for current-meter gaging stations, consisting of daily gage heights, discharge measurements, and full notes, are assembled. The measurements are plotted on cross-section paper and rating curves are drawn wherever feasible. The rating tables prepared from these curves are then applied to the tables of daily gage heights to obtain the daily discharges, and

from these applications the tables of monthly discharge and run-off are computed.

Rating curves are drawn and studied with special reference to the class of channel conditions which they represent. (See p. 17.) The discharge measurements for all classes of stations when plotted with gage heights in feet as ordinates and discharges in second-feet as abscissas define rating curves which are more or less generally parabolic in form. In many cases curves of area in square feet and mean velocity in feet per second are also constructed to the same scale of ordinates as the discharge curve. These are used mainly to extend the discharge curves beyond the limits of the plotted discharge measurements, and for checking purposes to avoid errors in the form of the discharge curve and to determine and eliminate erroneous measurements.

For every published rating table the following assumptions are made for the period of application of the table: (*a*) That the discharge is a function of and increases gradually with the stage; (*b*) that the discharge is the same whenever the stream is at a given stage, and hence such changes in conditions of flow as may have occurred during the period of application are either compensating or negligible, except that the rating as stated in the footnote of each table is not applicable for known conditions of ice, log jams, or other similar obstructions; (*c*) that the increased and decreased discharge due to change of slope on rising and falling stages is either negligible or compensating.

As already stated, the gaging stations may be divided into several classes, as indicated in the following paragraphs:

The stations of class 1 represent the most favorable conditions for an accurate rating and are also the most economical to maintain. The bed of the stream is usually composed of rock and is not subject to the deposit of sediment and loose material. This class includes also many stations located in a pool below which is a permanent rocky riffle that controls the flow like a weir. Provided the control is sufficiently high and close to the gage to prevent cut and fill at the gaging point from materially affecting the slope of the water surface, the gage height will for all practical purposes be a true index of the discharge. Discharge measurements made at such stations usually plot within 2 or 3 per cent of the mean-discharge curve and the rating developed from that curve represents a very high degree of accuracy. For illustrative example of a station of this type see figure 1 and Water-Supply Paper 241.

Class 2 is confined mainly to stations on rough mountainous streams with steep slopes. The beds of such streams are as a rule comparatively permanent during low and medium stages and when the flow is sufficiently well defined by an adequate number of discharge

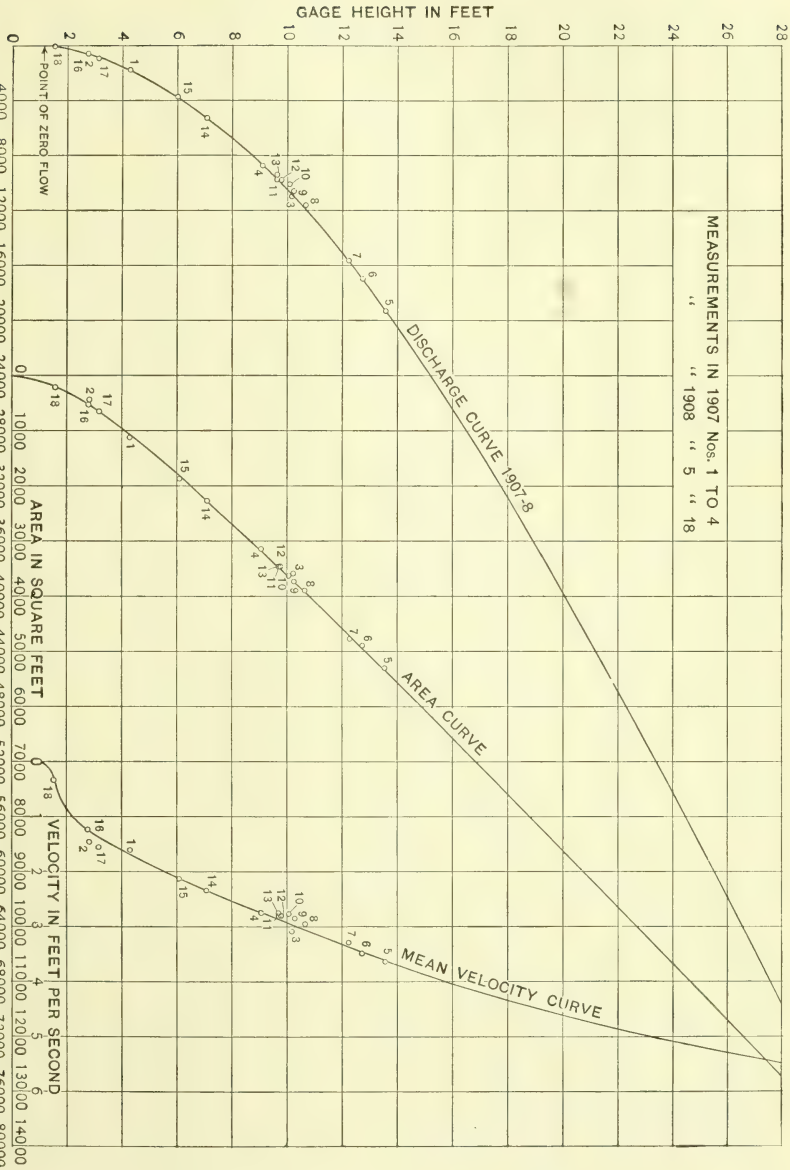


FIGURE 1.—Discharge, area, and mean velocity curves for Kiskiminetas River at Avonmore, Pa.

measurements before and after each flood the stations of this class give nearly as good results as those of class 1. As it is seldom possible to make measurements covering the time of change at flood stage, the assumption is often made that the curves before and after the flood converged to a common point at the highest gage height recorded during the flood. Hence the only uncertain period occurs during the few days of highest gage heights covering the period of actual change in conditions of flow. For illustrative examples of stations of this type see Water-Supply Paper 246.

Class 3 includes most of the current-meter gaging stations maintained by the United States Geological Survey. If sufficient measurements could be made at stations of this class results would be obtained nearly equaling those of class 1, but owing to the limited funds at the disposal of the Survey this is manifestly impossible, nor is it necessary for the uses to which discharge data are applied. The critical points are as a rule at relatively high or low stages. The percentage error, however, is greater at low stages. No absolute rule can be laid down for stations of this class. Each rating curve must be constructed mainly on the basis of the measurements of the current year, the engineer being guided largely by the past history of the station and the following general law: If all measurements ever made at a station of this class are plotted on cross-section paper, they will define a mean curve which may be called a standard curve. It has been found in practice that if after a change caused by high stage, a relatively constant condition of flow occurs at medium and low stages, all measurements made after the change will plot on a smooth curve which is practically parallel to the standard curve with respect to their ordinates or gage heights. This law of the parallelism of ratings is the fundamental basis of all ratings and estimates at stations with semipermanent and shifting channels. It is not absolutely correct but, with few exceptions, answers all the practical requirements of estimates made at low and medium stages after a change at a high stage. This law appears to hold equally true whether the change occurs at the measuring section or at some controlling point below. The change is of course fundamentally due to change in the channel caused by cut, or fill, or both, at and near the measuring section. For all except small streams the changes in section usually occur at the bottom. The following simple but typical examples illustrate this law:

(*a*) If 0.5 foot of planking were to be nailed on the bottom of a well-rated wooden flume of rectangular section there would result, other conditions of flow being equal, new curves of discharge, area, and velocity, each plotting 0.5 foot above the original curves when referred to the original gage. In other words, this condition would be analogous to a uniform fill or cut in a river channel which either

reduces or increases all three values of discharge, area, and velocity for any gage height. In practice, however, such ideal conditions rarely exist.

(*b*) In the case of a cut or fill at the measuring section there is a marked tendency toward decrease or increase, respectively, of the velocity. In other words, the velocity has a compensating effect and if the compensation is exact at all stages the discharge at a given stage will be the same under both the new and the old conditions.

(*c*) In the case of uniform change along the crest of a weir or rocky controlling point, the area curve will remain the same as before the change, and it can be shown that here again the change in velocity curve is such that it will produce a new discharge curve essentially parallel to the original discharge curve with respect to their ordinates.

Of course in actual practice such simple changes of section do not occur. The changes are complicated and lack uniformity, a cut at one place being largely offset by a fill at another and vice versa. If these changes are very radical and involve large percentages of the total area—as, for example, on small streams—there may result a wide departure from the law of parallelism of ratings. In complicated changes of section the corresponding changes in velocity which tend to produce a new parallel discharge curve may interfere with each other materially, causing eddies, boils, backwater, and radical changes in slope. In such extreme conditions, however, the measuring section would more properly fall under class 4 and would require very frequent measurements of discharge. Special stress is laid on the fact that in the lack of other data to the contrary the utilization of this law will yield the most probable results.

Slight changes at low or medium stages of an oscillating character are usually averaged by a mean curve drawn among them parallel to the standard curve, and if the individual measurements do not vary more than 5 per cent from the rating curve the results are considered good for stations of this class.

For illustrative example of a station of this type see Water-Supply Paper 242.

Class 4 comprises stations that have soft, muddy, or sandy beds. Good results can be obtained from such sections only by frequent discharge measurements, the frequency varying from a measurement every two or three weeks to a measurement every day, according to the rate of diurnal change in conditions of flow. These measurements are plotted and a mean or standard curve drawn among them. It is assumed that there is a different rating curve for every day of the year and that this rating is parallel to the standard curve with respect to their ordinates. On the day of a measurement the rating curve for that day passes through that

measurement. For days between successive measurements it is assumed that the rate of change is uniform, and hence the ratings for the intervening days are equally spaced between the ratings passing through the two measurements. This method must be modified or abandoned altogether under special conditions. Personal judgment and a knowledge of the conditions involved can alone dictate the course to pursue in such cases. For illustrative example of a station of this type, showing the Bolster method of determining the daily discharge graphically, see Water-Supply Papers 247 and 249.

The computations have, as a rule, been carried to three significant figures. Computation machines, Crelle's tables, and the 20-inch slide rule have been generally used. All computations are carefully checked.

After the computations have been completed they are entered in tables and carefully studied and intercompared to eliminate or account for all gross errors so far as possible. Missing periods are filled in, so far as feasible, by means of comparison with adjacent streams. The attempt is made to complete years or periods of discharge, thus eliminating fragmentary and disjointed records. Full notes accompanying such estimates follow the monthly discharge tables.

For most of the northern stations estimates have been made of the monthly discharge during frozen periods. These are based on measurements under ice conditions wherever available, daily records of temperature and precipitation obtained from the United States Weather Bureau climate and crop reports, observers' notes of conditions, and a careful and thorough intercomparison of results with adjacent streams. Although every care possible is used in making these estimates they are often very rough, the data for some of them being so poor that the estimates are liable to as much as 25 to 50 per cent error. It is believed, however, that estimates of this character are better than none at all, and serve the purpose of indicating in a relative way the proportionate amount of flow during the frozen period. These estimates are, as a rule, included in the annual discharge. The large error of the individual months has a relatively small effect on the annual total, and it is for many purposes desirable to have the yearly discharge computed even though some error is involved in doing so.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is

much more accurate than the individual measurements. Numerous tests and experiments have been made to test the accuracy of current-meter work. These show that it compares very favorably with the results from standard weirs, and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where uncertainty regarding the coefficient and complicated conditions of flow prevail.

The work is, of course, dependent on the reliability of the observers. With relatively few exceptions, the observers perform their work honestly. Care is taken, however, to watch them closely and to inquire into any discrepancies. It is, of course, obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the rating tables and an accuracy column is inserted in the monthly discharge table. In the rating tables "well defined" indicates in general that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

In general the policy is followed of making available for the public the base data which are collected in the field each year by the Survey engineers. This is done to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and

published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the data given in these papers will verify all ratings and make such adjustments in earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for five or ten year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The values in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates. This is particularly true of the maximum and minimum figures, which in the very nature of the method of collecting these data are liable to large errors. The maximum value should be increased considerably for many stations in considering designs for spillways, and the minimum value should be considered for a group of, say, seven days and not for one day.

The rating table, provided the engineer accepts it, is published primarily to allow him to apply it directly to the daily gage heights and rearrange the daily discharges in order of magnitude or by some other method.

COOPERATION AND ACKNOWLEDGMENTS.

Assistance has been rendered and records furnished by the following persons to whom special acknowledgment is due: Members of the United States Corps of Engineers; United States Weather Bureau; the Water Supply Commission of Pennsylvania; the North Carolina Geological Survey; the Geological Survey of Alabama; and to Dr. C. A. Schenck. The State of Illinois has paid for the stream gaging work performed in that State, the appropriation therefor being in charge of the Internal Improvement Commission, Isham Randolph, chairman.

DIVISION OF WORK.

The field data for Allegheny River at Redhouse, N. Y., have been collected under the direction of H. K. Barrows, district engineer, assisted by C. C. Covert, and C. R. Adams.

The field data for the Ohio River drainage basin, with the exception of Allegheny River at Redhouse, N. Y., and the Tennessee River drainage basin, have been collected under the direction of J. C. Hoyt, engineer, and A. H. Horton, district engineer, assisted by Robert Follansbee, R. H. Bolster, F. F. Henshaw, W. G. Hoyt, William O'Neill, Max Chapman, R. G. Knight, A. T. Barrows, H. D. Padgett, C. E. Langley, and R. J. Taylor. Stations in Pennsylvania are now maintained and the stream-flow data collected by the Water Supply Commission of Pennsylvania.

The field data in the Tennessee River drainage basin have been collected under the direction of M. R. Hall, district engineer, assisted by Warren E. Hall, W. A. Lamb, F. P. Thomas, O. P. Hall, B. M. Hall, jr., and F. A. Murray.

The ratings, special estimates, and studies of the completed data were made by M. R. Hall, A. H. Horton, R. H. Bolster, and F. F. Henshaw. The computations and preparation of the completed data for publication were made under the direction of R. H. Bolster, assistant engineer, assisted by F. F. Henshaw, G. C. Stevens, H. D. Padgett, G. L. Parker, J. G. Mathers, and M. I. Walters. The report has been edited by Mrs. B. D. Wood.

OHIO RIVER DRAINAGE BASIN.

GENERAL DESCRIPTION.

The drainage basin of Ohio River lies in the central part of the eastern half of the United States. The river is formed by the junction of Allegheny and Monongahela rivers at Pittsburg, Pa. From there it flows in a general southwesterly direction and joins the Mississippi at Cairo, Ill. The principal tributaries, beginning at the sources and following down the right or northern bank, are as follows: Allegheny, Beaver, Muskingum, Scioto, Miami, and Wabash rivers. On the left bank are Monongahela, Little Kanawha, Kanawha, Guyandotte, Big Sandy, Licking, Kentucky, Green, Cumberland (Pl. III), and Tennessee rivers. The total length of the river is 967 miles; the total drainage area is about 210,000 square miles.

The drainage basin of Ohio River comprises greater or less areas in the following States: New York, Pennsylvania, Maryland, West Virginia, Virginia, North Carolina, Georgia, Alabama, Tennessee, Kentucky, Ohio, Indiana, and Illinois. The northern boundaries are about 40 miles south of Buffalo, N. Y., the southern boundaries are within 300 miles of the Gulf of Mexico, and its eastern boundaries are about 225 miles from the Atlantic Ocean. The sources of the tributaries from the north lie in the glaciated area; the sources of the southern tributaries are located on the steep and rocky slopes of the western side of the Appalachian Mountains.

The topography varies from flat and rolling in the western and northern portions to rough and mountainous in the southern and eastern sections. In general, the rock floor of the valley is 30 to 50 feet below the level of the stream at low water. It rarely reaches a lower level than 75 feet below the stream. Its level is 65 or 75 feet below the stream between Evansville, Ind., and Shawneetown, Ill. It is thought that no place occurs in the whole length of the valley where a rock barrier crosses its entire width at a level as high as the bed of the present stream. In several places rock shelves extend out

part way across the river bed, leaving a channel deep enough for the passage of boats along the opposite bank. At Letart Falls the rock is stated to extend across the entire breadth of the stream, but it dips toward the east bank sufficiently to allow the passage of boats when the rock of the western part of the stream bed is above the water surface. Well data indicate that this descent continues eastward beneath the bottom lands to a level as low as in the neighboring parts of the channel. Near Ravenswood, W. Va., rocky reefs are exposed at low water fully halfway across the stream bed, but wells on the bottom lands near the village show the rock floor to be at least 25 feet below the stream at low water. At Louisville it is found by wells and bridge soundings that a channel 25 feet or more lower than the present surface at the head of the rapids leads southwestward from near the south end of the Jeffersonville bridge a short distance and then turns westward, passing through the midst of the city. Thus at the side of each of the three most conspicuous rock reefs touched by the stream a buried channel apparently occurs.

Notwithstanding the great number of riffles and shoals, the Ohio is generally navigable throughout the entire season for small boat drawing less than 3 feet of water. It is navigable for vessels drawing 6 feet of water during a few months of the early part of the season, but there is usually little traffic with such boats after the month of July. The canal at Louisville affords opportunity for passing around the rapids during low water. During high water stages the boats are able to pass over the rapids.

The valley of Ohio River along the southern boundary of Ohio and Indiana is very narrow except for a few miles near Louisville, and for a similar widening in the southwestern portion of Indiana. Its narrowness has been a subject of remark from the early days of settlement. There are very few places between Pittsburg and Louisville where its width exceeds 2 miles, and usually it is scarcely more than 1 mile wide. In the vicinity of Louisville it has a width of perhaps 4 miles, but below the mouth of Salt River it narrows abruptly to a width of about 1 mile, and remains narrow for nearly 100 miles. Beyond this narrow stretch it broadens out to a width of 6 or 8 miles, which it maintains for much of its course to Cairo, the only exception being found at the point where it passes the elevated ridge below Shawneetown. Here its width is reduced to about 2½ miles. The depth of the valley ranges from about 600 feet down to scarcely 100 feet, being greatest on the border of the "panhandle" of West Virginia and least in the lower portion of its course. Its depth seldom falls below 300 feet in the portion above Louisville and probably averages 450 feet. The narrow portion below Louisville is about 300 feet in depth. The broad portions at Louisville and in the lower parts of its course are but 100 to 150 feet in depth. The work done

CUMBERLAND RIVER FALLS, WHITLEY COUNTY, KY., IN 1896.

by the river in excavating a narrow valley through the elevated districts is apparently commensurate with that accomplished in eroding a wide valley in the low districts. The entire work of the stream, however, is less than should have been accomplished by a drainage line of this size in the time since the beginning of development of drainage lines. It is far less in proportion to its size than the work accomplished by the small tributaries which enter it from southern Indiana. The explanation of this meager amount of work is found in the enlargement of Ohio River in recent times. Investigations now in progress indicate that several independent drainage lines which formerly led northward from the Appalachian Mountains across southwestern New York, northwestern Pennsylvania, and Ohio into the Lake Erie basin have been united to form the present Ohio. The full extent of these changes is not yet determined, nor are all of the outlets for the old river systems satisfactorily traced; but enough is known to justify the statement that the small size of the valley of the Ohio is attributable to the geologically recent union of the several independent drainage systems.

Between Pittsburg and Wheeling the bed of the river is coarse gravel and bowlders and in places rock. Below Wheeling the gravel becomes finer, the bowlders fewer, and bars of river sand appear. Below the mouth of the Kanawha the river becomes more distinctly a river with sand in bed, although there are some gravel bars above Louisville.

The average width between banks does not increase materially from Pittsburg to Cincinnati. In the long pool above the falls of the Ohio at Louisville the average width is much greater than that above Cincinnati, while just below the falls there is a considerable narrowing. Below this the average width continues to increase toward the mouth of the river. The maximum width between banks is found about 20 miles above the mouth, where the width is considerably over a mile. There are many islands in the river, over 50 above Louisville and about 30 below, varying in size from a few acres to 5,000 acres. Many of them are cultivated and all are practically permanent in position.

The river presents an interesting series of shoals and riffles, separated by pools in which the water is deeper and the fall very low. The summary of the profile made by the army engineers shows 187 pools, with over 7 feet depth at low water. These occupy 632.5 miles and have an average length of 3.47 miles. Of these, 127 pools above Louisville, Ky., average 2.8 miles, with a total length of 363 miles; and 60 pools below Louisville, with a total length of 266 miles, have an average length of 4.4 miles.

On the borders of Ohio the riffles (103 in number) cover a combined length of 137 miles and have a total fall of 170 feet. The

pools, with a combined length of 309 miles, have a fall of 64 feet, or but 2.5 inches per mile. The greatest fall noted for a single mile on the border of this State is at Letart Falls, Meigs County, where a descent of 3.2 feet is made. There are 11 riffles, with a descent exceeding 2 feet per mile. The least fall reported is in a pool 8 to 15 miles below Cincinnati. This pool, with a length of 7 miles, has a fall of but 3.5 inches. Another pool with about as low a fall is found 23 to 30 miles above Cincinnati. These are the most conspicuous pools in this section of the Ohio.

On the borders of Indiana there are 55 riffles aside from the Louisville rapids. These show a total fall of 80.28 feet in a combined distance of 134.5 miles. At the Louisville rapids there is a fall of 23.09 feet in 2.25 miles. There is left but 18.13 feet for the fall of the stream in about 215 miles embraced in the pools, or only 1 inch per mile. The elevation of normal low water at Davis Island dam at Pittsburg, Pa., is 692 feet, low water elevation at Cairo is 273 feet, a total fall of 419 feet or an average fall of about 0.43 feet to the mile.

The northern and western portions of the drainage basin is a deforested area; the southern and eastern portions may be called partially forested, as large areas in the Appalachian Mountains at the sources of some of the southern tributaries are still covered with a heavy growth of trees; as the tributaries are descended the cleared areas increase until the forested area is small.

The mean annual rainfall is about 45 inches, ranging from 35 inches along the northern boundary of the basin to 70 inches in the southeastern part at the sources of Tennessee River. The winter conditions in general are mild; ice does not form very thick—on some tributaries hardly at all; the snowfall is light and does not last long. The headwaters of the Allegheny are an exception to these general conditions, for in that section the winter conditions are severe.

This drainage basin affords numerous sites for reservoirs, especially on the southern tributaries. From topographic maps covering part of the drainage basin of the Ohio River a large number of favorable reservoir sites were located, the capacity of some of which is enormous. Careful surveys would undoubtedly show many suitable sites for dams that would impound large reservoirs above them.

There are a great many opportunities for water-power development in this drainage basin. At the present time large developments are under way on some of the southern tributaries. At the dams on the Ohio constructed for the aid of navigation there is available a large amount of power that might be utilized, and if the Ohio should be completely canalized nearly all the total fall of the river would be available for water-power development except at high stages. The abundance of cheap fuel in those sections where power is most in demand has worked against the development of water power, but as

the supplies of coal and gas diminish attention will be directed to the development of the large amount of water power available in this basin.

Ohio River is the main tributary of the Mississippi as far as the flow of the river is concerned. The mean annual flow is about 300,000 cubic feet per second, which is much more than the discharge of St. Lawrence River at Ogdensburg, N. Y., although the drainage area of the St. Lawrence is nearly twice that of the Ohio. The maximum flow of the Ohio is in the neighborhood of 1,500,000 cubic feet per second, being about 30 times the low-water flow. A comparison of this river with the upper Mississippi and Missouri shows that although its drainage area is one-third that of the combined Mississippi and Missouri the mean and low water flow is 1.3 times as great as their combined flow, and its maximum flow is 1.5 times as great. This is accounted for by the greater rainfall and by the character of the drainage basin of the Ohio.

Navigation in the Ohio is stopped not only by low stages of the river, but also occasionally by ice, averaging ten to twelve days per year. The losses of steamboats, barges, and flatboats due to ice are at times very great. Sometimes the ice forms and passes off without occasioning serious loss; sometimes there may be more than one serious break-up during the same winter.

The United States Weather Bureau and the U. S. Engineer Corps have maintained a number of gages on Ohio River at various places. Measurements have been made by the engineers of the United States Geological Survey on Ohio River at Wheeling, W. Va.

ALLEGHENY RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Allegheny River, which unites with Monongahela River at Pittsburg to form the Ohio, drains the western slopes of the Allegheny Mountains. The Allegheny is the larger stream, as its drainage area is nearly 50 per cent greater than that of the Monongahela.

The drainage basin of the Allegheny lies in the States of Pennsylvania and New York. The river rises in the central part of Potter County, in the northern part of Pennsylvania, flows in a general northwesterly direction across the state line into New York to about the central part of Cattaraugus County; thence it flows southwestward back into Pennsylvania. At Franklin, in Venango County, the river turns and flows southeastward to the mouth of Mahoning Creek, in Armstrong County; thence it turns to the southwest, and at Pittsburg joins Ohio River. The important tributaries, beginning at the source and following down the right bank, are as follows: Oswayo, Olean, Conewango, Brokenstraw, Oil, and French creeks; on the left

bank are: Potato, Tunugwant, and Tionesta creeks, Clarion River, Red Bank, Mahoning, and Crooked creeks, and Kiskiminetas River. The total length of the river is about 290 miles (map measurement); the total drainage area is about 11,100 square miles.

The drainage basin is somewhat regular in shape, being about 2½ times as long as it is wide. Below Franklin, Pa., the river flows near the western boundary of its basin. The surrounding country is extremely rough and broken, being made up of high hills or mountains separated by deep valleys. As the limits of the basin to the west of the main river are approached the mountainous character is lost, though the surface is still rolling and hilly. The northwestern boundary of the basin is about 8 miles from Lake Erie at one point, lying within about 40 miles of Buffalo.

The bed of the stream is composed chiefly of gravel, varying from small pebbles to cobblestones. The banks are composed of sand, gravel, or clay. The drainage area is underlain by shales, and the depth of the soil is, except in stream valleys, small. This basin is exceptionally rich in natural resources, there being abundant supplies of coal, oil, gas, limestone, glass sand, and building stones. Pittsburg is at the center of a great manufacturing and shipping district.

The elevation of the sources of the river is about 2,500 feet; at Olean, N. Y., the elevation is 1,420 feet; at Franklin, Pa., the elevation is 960 feet; at Pittsburg, the elevation is 707 feet.

This basin was at one time covered with timber, the principal varieties being pine and hemlock. At the present time, however, only light forests and brush are found at the headwaters of the tributaries, the pine and hemlock having been cut off some time ago, and the basin would probably be considered a deforested area.

The mean annual rainfall is about 40 inches. The winter conditions are severe. Snowfall is heavy in the upper part of the basin and lasts for long periods, and ice forms about 2 feet in thickness. The heavy ice during the spring floods is very destructive. Jams frequently occur which cause considerable damage from backwater.

The basin affords good opportunities for storage reservoirs. Careful surveys would undoubtedly show a number of excellent sites for reserviors of large capacity.

The fall of the main stream and tributaries is above the average, and if it were situated in a district where fuels were more expensive the stream would undoubtedly be largely used for power. When the price of coal advances so that water power may compete with steam, the water power on this stream will be more extensively developed.

The Cuba reservoir, which feeds the Erie Canal through Genesee River, lies on the divide between the Allegheny and Genesee drainage basins. Part of the overflow from this reservoir passes into the Allegheny, the rest passes into Genesee River. Allegheny River is

subject to very severe floods, which cause heavy losses to manufacturing and other interests along the river. The river is navigable for part of the year for small steamers to Franklin, 123 miles above the mouth.

The following gaging stations have been maintained in this drainage basin:

Allegheny River at Redhouse, N. Y., 1903–1908.
Allegheny River at Kittanning, Pa., 1904–1908.
Chautauqua Lake outlet near Jamestown, N. Y., 1895.
Chadakoin River near Jamestown, N. Y., 1904–1905.
Kiskiminetas River at Avonmore, Pa., 1907–1908.
Kiskiminetas River at Salina, Pa., 1904–1906.
Blacklick Creek at Blacklick, Pa., 1904–1908.

ALLEGHENY RIVER AT REDHOUSE, N. Y.

This station, which is located at the Redhouse highway bridge, near the stations of the Erie and Pennsylvania railroads and about 5 miles below Salamanca, N. Y., and nearly 13 miles above the point where the river leaves New York State, was established September 4, 1903, to obtain general statistical data regarding the flow of the Allegheny, and is maintained in cooperation with the New York state engineer's department.

At Olean, N. Y., the wasteway from the Cuba reservoir enters the stream through Olean Creek. This reservoir is located on the divide between Oil Creek, tributary to Allegheny River, and Genesee River. The storage is commonly turned into Genesee River through the abandoned summit level of Genesee Valley Canal, but may be diverted into Oil Creek through the guard lock at the head of the canal. There are no lakes and no artificial storage tributary to the stream above the gaging station. Conewango Creek, the outlet of Chautauqua Lake, is tributary to the Allegheny and enters the stream in the State of Pennsylvania.

The datum of the gage has remained the same during the maintenance of the station. Conditions for obtaining the accurate discharge are good, and an excellent rating curve has been developed. Moderate ice conditions usually prevail during the winter months.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Allegheny River at Redhouse, N. Y., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907. Mar. 16	C. C. Covert	366	2,390	7.00	8,970
1908. Oct. 20	C. R. Adams	355	840	2.70	145

Daily gage height, in feet, of Allegheny River at Redhouse, N. Y., for 1907 and 1908.

[Observers, R. W. Crain and Ora A. Gates.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	4.25	.....	6.4	5.8	4.4	5.5	3.2	2.7	3.2	3.6	3.8
2	.....	4.2	3.5	5.7	5.6	5.15	5.5	3.2	2.7	3.1	3.6	3.8
3	.....	4.2	.....	5.3	5.2	6.1	5.3	3.2	2.8	3.0	3.5	3.7
4	.....	4.25	.....	5.0	6.1	5.5	5.0	3.2	2.8	5.0	5.2	3.6
5	.....	4.25	.....	5.0	6.5	5.4	4.5	3.1	2.9	4.5	5.0	3.5
6	.....	3.9	.....	4.8	5.8	6.6	4.3	3.0	2.8	3.9	4.7	3.4
7	.....	4.0	.....	4.6	5.4	6.3	4.2	3.0	2.8	4.9	4.5	3.4
8	.....	4.1	.....	4.5	6.2	5.5	4.1	3.0	2.9	5.5	5.4	3.3
9	.....	3.85	3.2	4.6	6.0	5.1	3.9	3.0	2.8	5.0	5.3	3.5
10	.....	3.75	3.2	4.5	5.6	4.8	3.8	3.0	2.8	5.2	4.8	3.7
11	.....	.....	3.3	4.5	5.3	4.6	3.6	2.9	3.0	5.2	4.7	5.0
12	.....	.....	3.3	4.5	5.1	4.4	5.95	2.9	3.3	4.9	4.5	5.6
13	.....	.....	3.7	4.6	4.9	4.2	5.6	2.9	3.2	4.8	4.3	5.4
14	.....	.....	5.55	4.6	4.6	4.2	4.5	2.9	3.1	4.7	4.2	5.3
15	.....	.....	7.1	4.5	4.4	4.2	4.1	2.8	3.0	4.5	3.9	5.2
16	.....	3.6	7.15	4.4	4.6	3.9	3.9	2.8	2.9	4.5	3.8	4.8
17	5.1	.....	7.55	4.4	4.7	3.8	3.8	2.8	2.9	4.8	3.8	4.7
18	4.95	.....	7.8	4.3	4.6	3.7	3.8	2.8	2.9	4.7	3.7	4.3
19	5.3	.....	7.6	4.2	4.6	3.7	3.6	2.8	3.0	4.5	3.8	4.2
20	7.1	.....	7.9	4.2	5.5	3.7	3.5	2.8	3.0	4.4	3.7	4.2
21	6.9	.....	7.5	4.1	5.6	3.7	3.4	2.9	3.1	5.0	3.7	4.0
22	6.15	.....	7.1	4.0	5.3	3.7	3.4	2.8	3.0	4.9	3.6	4.5
23	5.8	3.2	7.7	3.9	5.0	4.4	3.3	2.8	3.0	4.7	3.7	5.6
24	5.25	.....	7.7	6.85	4.7	5.1	3.3	2.8	3.0	4.3	3.7	5.5
25	5.2	.....	7.4	7.3	4.5	5.0	3.3	2.8	3.0	4.0	3.6	5.0
26	5.1	.....	7.1	7.4	4.4	5.0	3.3	2.8	2.9	3.8	3.5	4.8
27	4.95	.....	7.5	7.7	5.6	4.6	3.5	2.8	2.9	3.6	3.6	5.6
28	4.55	.....	8.35	7.1	5.9	4.3	3.4	2.8	2.9	4.0	3.7	7.9
29	4.5	.....	7.95	6.6	5.3	4.1	3.2	2.7	3.5	3.8	3.8	7.5
30	4.4	.....	7.35	6.2	4.9	4.2	3.2	2.7	3.4	3.8	4.0	7.2
31	4.2	.....	6.8	.....	4.6	.....	3.1	2.7	.....	3.7	.....	6.8
1908.												
1	6.4	4.0	5.3	8.0	5.1	6.2	3.7	3.5	3.0	2.7	2.7	2.7
2	6.1	.....	5.4	7.6	6.0	6.0	3.6	3.5	3.0	2.8	2.7	2.7
3	5.9	.....	5.6	7.4	6.5	5.5	3.6	3.5	2.9	2.8	2.7	2.7
4	5.7	.....	6.4	7.0	6.5	5.1	4.8	3.5	2.9	2.8	2.7	.....
5	5.4	.....	6.3	6.8	6.3	4.8	4.0	3.4	2.9	2.7	2.8	2.7
6	5.1	.....	6.3	6.5	6.4	4.6	3.8	3.4	2.9	2.7	2.8	.....
7	4.8	.....	6.2	6.3	7.2	4.5	3.7	3.4	2.8	2.7	2.8	.....
8	4.6	4.2	6.2	6.4	8.1	4.4	3.6	3.4	2.8	2.7	2.7	.....
9	4.5	.....	6.0	6.4	7.9	4.2	3.4	3.4	2.8	2.7	2.7	.....
10	4.5	.....	5.8	6.3	7.6	4.0	3.3	3.3	2.8	2.7	2.7	.....
11	4.4	.....	5.4	6.3	7.0	3.9	3.2	3.3	2.7	2.7	2.8	.....
12	5.0	.....	5.8	6.2	6.4	3.8	3.2	3.3	2.7	2.7	2.8	2.7
13	6.3	.....	6.2	5.0	6.0	3.6	3.1	3.3	2.7	2.7	2.8	.....
14	5.7	.....	6.3	4.9	5.6	3.5	3.1	3.3	2.7	2.7	2.9	.....
15	5.3	10.2	7.8	4.9	5.8	5.65	3.0	3.2	2.7	2.7	2.8	.....
16	5.0	10.8	11.2	5.1	6.4	5.5	3.0	3.2	2.7	2.7	2.8	.....
17	4.9	9.1	10.0	4.9	6.6	4.5	3.0	4.1	2.7	2.7	2.9	.....
18	4.8	8.9	8.9	4.9	6.4	3.8	3.1	4.3	2.7	2.7	2.9	.....
19	4.7	8.3	8.5	5.3	6.2	3.7	3.1	3.9	2.7	2.7	3.0	3.7
20	4.6	7.8	9.5	7.3	6.0	3.6	3.0	3.4	2.7	2.7	3.0	.....
21	4.6	7.4	8.5	6.4	6.0	3.5	3.5	3.3	2.7	2.7	3.0	.....
22	4.5	7.0	8.0	6.0	5.6	3.5	3.8	3.3	2.7	2.7	3.0	.....
23	4.5	6.6	7.4	5.9	5.4	3.8	4.0	3.3	2.7	2.7	2.9	.....
24	4.4	6.2	6.9	5.8	5.1	6.25	4.8	3.2	2.7	2.7	2.9	.....
25	4.3	5.9	6.5	5.7	5.0	5.6	5.0	3.2	2.7	2.7	2.9	.....
26	.....	5.7	7.2	5.5	5.2	4.5	5.7	3.2	2.7	2.7	2.9	3.4
27	.....	5.6	7.5	5.3	5.6	4.0	5.0	3.1	2.7	2.7	2.8	3.6
28	.....	5.4	8.6	5.2	5.6	3.8	4.5	3.1	2.7	2.7	2.8	3.7
29	.....	5.4	8.6	5.1	6.0	3.7	4.1	3.1	2.7	2.7	2.8	3.7
30	.....	.....	9.0	5.0	6.0	3.7	3.8	3.0	2.7	2.7	2.8	3.6
31	.....	.....	8.6	.....	6.2	.....	3.6	3.0	.....	2.7	.....	3.8

NOTE.—Ice conditions prevailed from about February 11 to March 13, 1907, and January 26 to February 14 and December 4 to 26, 1908.

Rating table for Allegheny River at Redhouse, N. Y., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.70	145	4.00	1,471	5.30	3,820	7.20	9,400
2.80	220	4.10	1,605	5.40	4,065	7.40	10,080
2.90	295	4.20	1,745	5.50	4,315	7.60	10,790
3.00	380	4.30	1,891	5.60	4,570	7.80	11,530
3.10	470	4.40	2,043	5.70	4,830	8.00	12,300
3.20	560	4.50	2,200	5.80	5,100	8.20	13,120
3.30	655	4.60	2,365	5.90	5,375	8.40	13,960
3.40	755	4.70	2,540	6.00	5,660	8.60	14,800
3.50	866	4.80	2,725	6.20	6,245	8.80	15,660
3.60	978	4.90	2,920	6.40	6,845	9.00	16,540
3.70	1,095	5.00	3,130	6.60	7,460	10.00	21,100
3.80	1,216	5.10	3,350	6.80	8,090	11.00	26,200
3.90	1,341	5.20	3,580	7.00	8,740	12.00	31,800

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903 to 1908 and is well defined.

Monthly discharge of Allegheny River at Redhouse, N. Y., for 1907 and 1908.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	1,740	5,630	3.43	3.95	B.
February	1,820	[a] 400	1,000	.610	.64	C.
March	13,800	[a] 450	6,100	3.72	4.29	A.
April	11,200	1,340	4,030	2.46	2.74	A.
May	7,150	2,040	3,800	2.32	2.68	A.
June	7,460	1,100	2,700	1.65	1.84	A.
July	5,520	470	1,720	1.05	1.21	A.
August	560	145	303	.185	.21	A
September	866	145	360	.220	.25	A.
October	4,320	380	2,160	1.32	1.52	A.
November	4,060	866	1,710	1.04	1.16	A.
December	11,900	655	3,290	2.01	2.32	A.
The year	13,800	145	2,730	1.67	22.81	
1908.						
January	6,840	[a] 1,100	3,000	1.83	2.11	A.
February	25,100	[a] 500	5,890	3.59	3.87	B.
March	27,300	3,820	10,300	6.28	7.24	A.
April	12,300	2,920	5,820	3.55	3.96	A.
May	12,700	3,130	6,340	3.87	4.46	A.
June	6,240	866	2,400	1.46	1.63	A.
July	4,830	380	1,290	.787	.91	A.
August	1,890	380	743	.453	.52	A.
September	380	145	191	.116	.13	A.
October	220	145	152	.093	.11	A.
November	380	145	241	.147	.16	A.
December	1,220	[a] 100	357	.218	.25	C.
The year	27,300	[a] 100	3,060	1.87	25.35	

[a] Ice conditions; only roughly approximate.

NOTE.—Discharge during the frozen period 1907 based on discharge of Allegheny River at Kittanning, Pa., drainages in the Susquehanna River basin, and climatological reports. Discharge January 1–16, 1907, based on discharge of Allegheny River at Kittanning, Pa., and Susquehanna River at Binghamton, N. Y.

Discharge January 1–16, 1907, 7,100 second-feet; February 11–28, 1907, 681 second-feet; March 1–13, 1907, 477 second-feet.

Discharge during the frozen periods 1908 estimated on the basis of the discharge of Allegheny River at Kittanning Pa., Susquehanna River drainages and climatological reports.

Discharge January 26–31, 1908, 1,400 second-feet; February 1–14, 1908, 729 second-feet; December 4–26, 1908, 228 second-feet.

ALLEGHENY RIVER AT KITTANNING, PA.

This station was established by the United States Geological Survey August 18, 1904, at the Market Street Bridge in the city of Kittanning, Pa. It is now maintained by the Water Supply Commission of Pennsylvania, who furnish the records of gage heights and discharge measurements. It was established to obtain general comparative and statistical data regarding the flow of Allegheny River for the study of flood prevention at Pittsburg and on Ohio River, also for the determination of the regimen of flow for power and navigation projects and for the prevention of pollution.

There are no important tributaries in the immediate vicinity of Kittanning. Crooked River enters Allegheny River from the east 4 miles below and Kiskiminetas River enters from the east over 12 miles below the station.

The datum of the gage has remained constant since the installation of the station. There is obstruction from ice during short periods each winter. Conditions of flow are practically constant and an excellent low and medium stage rating curve has been developed. At high stages numerous measurements have been made. There is, however, a marked difference between the discharge at a given high gage height for rising and falling stage due to increase and decrease of slope. The difference in some cases amounts to as much as 15 per cent, and since the variation differs for each flood it is difficult to determine the daily discharge at high stages with accuracy.

Discharge measurements of Allegheny River at Kittanning, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec. ft.*
May 30	A. H. Horton	861	7,270	8.00	25,300
September 11[a]	do	648	3,320	3.24	4,150
1908.					
August 23	R. H. Bolster	613	2,710	2.67	2,690
September 25	C. E. Ryder	466	1,710	1.37	847

[a] Surface measurement.

Daily gage height, in feet, of Allegheny River at Kittanning, Pa., for 1907 and 1908.

[Observer, S. B. Cochrane.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	8.4	5.1	4.2	9.4	8.0	5.9	4.7	2.8	1.7	3.2	5.2	4.1
2	10.5	5.2	4.6	8.3	7.5	6.0	6.9	2.8	1.9	3.2	4.9	4.8
3	9.6	5.4	5.8	7.6	7.2	7.5	7.0	4.6	2.4	3.2	6.1	4.6
4	9.5	5.6	6.0	6.9	7.8	8.3	6.3	4.0	2.0	4.2	9.8	4.1
5	12.9	5.0	6.1	6.7	8.5	7.9	5.6	2.4	2.2	7.35	9.3	4.2
6	12.4	5.1	6.8	6.7	9.0	8.8	5.2	3.2	2.0	6.6	9.3	4.0
7	11.2	4.8	5.6	6.6	8.7	9.9	4.6	2.8	1.9	6.7	8.9	3.9
8	10.9	4.5	5.2	6.4	8.0	9.3	4.4	2.7	1.8	6.8	8.2	3.7
9	13.7	4.3	4.8	6.2	8.6	8.0	4.0	2.6	2.0	5.8	8.6	4.6
10	12.8	4.4	4.7	6.3	8.1	6.9	3.8	2.4	2.0	6.9	8.4	5.2
11	11.3	4.7	4.6	6.1	7.3	6.3	3.7	2.3	3.0	6.9	8.3	6.0
12	10.3	4.5	4.7	5.9	6.8	7.0	3.7	2.3	4.0	5.5	8.1	7.1
13	10.0	4.8	8.6	5.9	6.3	6.4	3.8	2.0	3.8	5.0	7.8	8.0
14	9.7	4.3	14.0	5.6	6.2	7.9	6.0	2.1	3.5	5.6	7.6	6.6
15	10.9	4.2	15.9	6.2	5.6	7.5	5.3	1.8	2.9	6.2	7.5	6.4
16	10.1	5.0	14.2	5.9	5.9	6.6	4.5	1.8	2.7	5.9	7.4	6:1
17	9.2	4.5	13.0	5.7	7.3	5.8	3.9	2.0	2.7	5.3	7.0	6.1
18	8.1	4.6	13.1	5.6	7.2	5.3	4.4	1.8	3.3	4.7	6.6	6.0
19	9.4	4.6	12.7	5.5	6.6	4.8	4.3	1.9	3.9	4.2	6.2	5.9
20	13.5	5.1	13.8	5.3	6.4	4.6	3.9	1.8	3.6	3.9	5.8	5.8
21	13.6	5.5	13.3	5.2	7.2	4.5	3.5	1.7	3.5	3.6	5.4	4.5
22	12.7	5.5	11.8	5.0	6.8	4.6	3.0	1.7	3.6	3.7	5.1	4.7
23	10.3	5.6	10.6	4.8	6.3	4.8	3.0	1.8	3.4	3.8	4.7	5.7
24	8.1	5.0	10.8	6.2	5.9	4.6	3.0	1.8	3.1	3.7	4.5	15.0
25	7.0	4.6	10.3	9.5	5.6	5.0	3.2	1.7	2.8	3.7	4.4	15.3
26	6.5	4.0	9.4	9.9	5.4	5.6	3.1	1.9	2.5	3.5	4.4	13.2
27	6.7	4.4	10.4	12.0	5.9	5.4	4.2	1.9	2.3	3.4	4.1	11.6
28	5.9	4.2	12.8	10.9	10.0	5.3	3.7	1.8	2.3	4.4	4.3	10.2
29	5.6	.....	13.5	9.6	9.1	4.8	3.4	1.5	2.8	5.9	4.5	11.4
30	5.6	.....	12.5	8.5	7.7	4.6	3.3	1.8	3.3	6.4	4.9	11.2
31	5.3	.....	10.8	.....	6.6	.....	3.0	1.6	.....	5.9	.....	11.1
1908.[b]												
1	10.4	6.9	5.4	10.9	7.4	8.3	3.7	3.5	1.77	1.57	1.57	1.77
2	9.8	8.2	12.5	9.0	8.4	7.9	3.6	3.2	1.67	1.67	1.57	1.77
3	8.4	8.2	14.7	8.6	10.2	7.1	3.9	3.0	1.57	1.67	1.57	1.87
4	7.6	8.2	12.1	8.2	10.8	6.6	3.7	3.0	1.57	1.67	1.47	1.87
5	7.1	8.2	11.4	7.8	11.0	6.0	6.9	2.8	1.47	1.57	1.47	1.87
6	6.8	8.3	12.9	7.3	11.0	5.3	5.0	2.6	1.37	1.57	1.37	1.87
7	6.2	8.3	16.4	7.6	11.2	5.2	4.5	3.0	1.47	1.57	1.37	1.87
8	5.3	8.2	14.9	8.6	13.1	5.0	4.2	3.3	1.57	1.47	1.37	1.87
9	5.3	8.1	13.5	9.6	12.6	4.9	3.8	3.3	1.67	1.47	1.47	1.87
10	5.2	8.0	11.8	10.2	11.0	5.2	3.3	3.3	1.77	1.47	1.47	1.87
11	4.1	8.0	9.8	9.6	10.3	4.8	3.4	3.3	1.67	1.47	1.57	2.0
12	6.3	.....	10.4	8.5	9.3	4.8	3.6	3.0	1.67	1.47	1.57	2.0
13	7.2	.....	12.9	8.2	8.8	4.6	3.6	2.9	1.57	1.47	1.67	2.0
14	10.9	11.0	14.5	8.0	7.9	4.6	3.5	2.6	1.57	1.47	1.77	2.1
15	9.6	18.9	15.4	8.1	7.1	4.4	3.7	2.2	1.47	1.37	1.67	2.1
16	8.5	24.3	16.8	8.4	8.5	4.2	3.7	2.1	1.47	1.47	1.57	2.2
17	7.5	18.7	16.5	8.2	12.1	4.2	4.6	2.0	1.47	1.47	1.67	2.4
18	6.8	15.4	16.9	8.0	10.6	4.0	5.2	2.0	1.47	1.47	1.67	4.9
19	6.4	12.8	18.7	8.6	10.6	3.8	5.3	2.3	1.47	1.47	1.67	6.4
20	6.0	10.9	17.6	9.9	12.1	3.6	5.4	2.6	1.37	1.47	1.67	6.5
21	5.8	9.8	13.9	10.4	11.2	3.4	5.2	2.7	1.37	1.37	1.77	5.0
22	5.6	8.3	11.2	9.1	10.1	3.5	4.9	3.1	1.37	1.37	1.77	4.1
23	6.0	7.5	10.4	8.5	9.6	3.8	6.8	2.7	1.37	1.37	1.77	3.6
24	6.3	6.7	9.3	8.0	8.3	4.2	8.1	2.3	1.37	1.37	1.87	3.2
25	6.1	6.3	9.1	7.8	7.6	4.8	7.9	2.2	1.37	1.37	1.87	3.8
26	5.8	6.5	8.8	7.1	7.3	5.2	6.1	2.2	1.37	1.47	1.87	4.1
27	5.6	6.3	8.6	6.6	7.1	4.9	5.5	2.0	1.37	1.47	1.97	4.0
28	7.7	5.8	9.5	6.4	10.2	4.6	5.0	2.0	1.37	1.47	1.97	3.9
29	6.8	5.2	10.9	6.9	8.7	4.2	4.8	1.87	1.47	1.47	1.87	4.1
30	5.9	.....	10.9	7.6	9.1	3.9	4.4	1.77	1.57	1.47	1.77	4.3
31	5.1	.....	10.8	.....	8.7	.....	3.9	1.77	.....	1.57	.....	4.7

[a] There may have been slight effect from ice conditions January 25 to March 12, 1907. All slight rises in stage during this period can, however, be readily explained from the precipitation and temperature records. December, 1907, open.

[b] Floating ice January 6–18 and 24–28, 1908, and February, 15, 1908. Ice conditions February 1 and 2 and river frozen February 3–14, 1908. Ice moved February 14, 1908. River clear February 16, 1908. December, 1908, probably not affected by ice. All rises in stage during this month can be explained from precipitation and temperature records.

Rating table for Allegheny River at Kittanning, Pa., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.40	880	3.20	3,860	4.90	9,165	9.00	29,930
1.50	980	3.30	4,110	5.00	9,545	10.00	34,730
1.60	1,080	3.40	4,370	5.20	10,320	11.00	40,700
1.70	1,190	3.50	4,640	5.40	11,130	12.00	47,150
1.80	1,310	3.60	4,920	5.60	11,970	13.00	54,280
1.90	1,440	3.70	5,210	5.80	12,830	14.00	62,110
2.00	1,580	3.80	5,500	6.00	13,720	15.00	70,410
2.10	1,720	3.90	5,800	6.20	14,620	16.00	79,220
2.20	1,870	4.00	6,105	6.40	15,540	17.00	88,620
2.30	2,030	4.10	6,415	6.60	16,470	18.00	98,620
2.40	2,200	4.20	6,735	6.80	17,430	19.00	109,150
2.50	2,380	4.30	7,065	7.00	18,410	20.00	120,330
2.60	2,560	4.40	7,400	7.20	19,390	21.00	132,210
2.70	2,750	4.50	7,740	7.40	20,400	22.00	144,710
2.80	2,950	4.60	8,085	7.60	21,420	23.00	157,920
2.90	3,160	4.70	8,435	7.80	22,470	24.00	171,720
3.00	3,385	4.80	8,795	8.00	23,540	25.00	185,720
3.10	3,620						

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1904 to 1908 and is well defined.

Monthly discharge of Allegheny River at Kittanning, Pa., for 1907 and 1908.

[Drainage area, 8,690 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	59,700	10,700	34,300	3.95	4.55	B.
February	12,000	6,100	8,890	1.02	1.06	B.
March	78,300	6,740	34,400	3.96	4.56	B.
April	47,200	8,800	19,100	2.20	2.46	A.
May	34,700	11,100	19,700	2.27	2.62	A.
June	34,200	7,740	15,800	1.82	2.03	A.
July	18,400	3,380	7,400	.852	.98	A.
August	8,080	980	2,130	.245	.28	A.
September	6,100	1,190	3,100	.357	.40	A.
October	20,100	3,860	10,200	1.17	1.35	A.
November	33,600	6,420	17,100	1.97	2.20	A.
December	73,000	5,210	21,400	2.46	2.84	A.
The year	78,300	980	16,100	1.86	25.33	
1908.						
January	40,100	6,420	18,200	2.09	2.41	B.
February	176,000	.....	29,300	3.37	3.64	B.
March	106,000	11,100	53,600	6.17	7.11	B.
April	40,100	15,500	25,800	2.97	3.31	A.
May	55,000	18,900	33,600	3.87	4.46	B.
June	25,200	4,370	9,620	1.11	1.24	A.
July	24,100	4,110	9,140	1.05	1.21	A.
August	4,640	1,270	2,680	.308	.36	A.
September	1,270	853	987	.114	.13	A.
October	1,160	853	968	.111	.13	A.
November	1,540	853	1,150	.132	.15	A.
December	16,000	1,270	4,420	.509	.59	A.
The year	176,000	853	15,800	1.82	24.74	

NOTE.—Discharge February 1–14, 1908, estimated on the basis of climatological data and general run-off conditions in adjacent drainages.

Discharge February 1–14, 1908, 9,110 second-feet.

KISKIMINETAS RIVER AT AVONMORE, PA.

This station was established June 11, 1907, at the highway bridge near Avonmore station on the Pennsylvania Railroad. It is maintained by the Water Supply Commission of Pennsylvania, who furnish the records of gage height and discharge measurements. It was established to obtain general comparative and statistical data regarding the flow of Kiskiminetas River for the study of power and water pollution problems. This river is subject to sudden violent floods similar to those which occur in the Youghiogheny and Monongahela river drainages. These floods when combined make themselves felt with disastrous effects at Pittsburg and other cities on Ohio River. In the flood of March 19, 1908, the river rose to a crest height of 30.8 feet. The estimated discharge was 80,500 second-feet, or 46 second-feet per square mile, from a drainage area of 1,750 square miles.

The nearest important tributary is Loyalhanna Creek, which enters from the left about 5 miles above the station. Blacklegs Creek enters from the right about 4 miles above the station, and Long Run enters from the right about 1 mile below the station.

The discharge is affected by ice for short periods during the winter months. The datum of the gage has remained unchanged since the establishment of the station. Conditions of flow appear to be constant, and an excellent rating curve has been developed for stages below about 15 feet. (See fig. 1, p. 23.)

Discharge measurements of Kiskiminetas River at Avonmore, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 29	A. H. Horton	391	1,100	4.36	1,780
August 13	Horton and Padgett	312	434	2.89	635
September 11	A. H. Horton	416	3,550	10.26	11,000
September 12	do	408	3,140	9.15	8,600
1908.					
March 3	Kenneth Grant	429	5,280	13.64	19,200
Do	do	429	4,870	12.81	17,000
Do	do	424	4,760	12.35	15,700
March 4	do	422	3,880	10.74	11,500
Do	do	419	3,710	10.32	10,500
Do	do	418	3,580	10.08	9,880
Do	do	417	3,460	9.79	9,630
March 5	do	417	3,460	9.85	9,660
Do	do	417	3,460	9.79	9,400
May 11	do	403	2,250	7.17	5,250
May 13	do	398	1,810	6.06	3,770
July 23	do	382	508	2.86	628
August 23	R. H. Bolster	384	629	3.26	976
September 25	C. E. Ryder	185	199	1.61	68.5

Daily gage height, in feet, of Kiskiminetas River at Avonmore, Pa., for 1907 and 1908.

[Observers, Mrs. Thomas Green and Ralph Fickes.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	4.6	3.3	2.9	4.5	3.8	4.1
2	.....	.....	.....	.....	.....	.....	4.2	3.2	2.8	4.0	3.6	4.0
3	.....	.....	.....	.....	.....	.....	4.0	3.1	5.5	3.7	7.0	3.9
4	.....	.....	.....	.....	.....	.....	3.7	2.9	6.4	4.3	9.4	3.8
5	.....	.....	.....	.....	.....	.....	3.4	2.8	6.0	6.4	7.7	3.6
6	.....	.....	.....	.....	.....	.....	3.2	2.9	5.0	5.5	6.7	3.3
7	.....	.....	.....	.....	.....	.....	3.2	3.5	4.3	4.8	9.9	4.1
8	.....	.....	.....	.....	.....	.....	4.2	3.3	3.8	4.5	11.0	4.0
9	.....	.....	.....	.....	.....	.....	3.6	3.4	3.6	6.2	8.6	3.9
10	.....	.....	.....	.....	.....	.....	3.4	3.4	3.5	5.4	7.5	4.7
11	.....	.....	.....	.....	.....	4.6	4.2	3.6	8.8	4.8	6.4	12.0
12	.....	.....	.....	.....	.....	8.1	6.6	3.1	9.0	4.5	6.0	8.7
13	.....	.....	.....	.....	.....	7.3	6.5	2.9	6.8	4.2	5.4	6.8
14	.....	.....	.....	.....	.....	13.0	5.3	2.7	5.4	4.0	5.0	6.2
15	.....	.....	.....	.....	.....	10.8	4.4	2.6	4.6	3.7	4.9	6.1
16	.....	.....	.....	.....	.....	8.2	3.8	2.5	4.1	3.5	4.5	6.7
17	.....	.....	.....	.....	.....	6.8	3.6	2.6	3.9	3.3	4.2	6.0
18	.....	.....	.....	.....	.....	6.1	4.5	2.6	3.7	3.2	4.1	5.8
19	.....	.....	.....	.....	.....	5.3	5.0	2.5	4.1	3.1	4.2	5.4
20	.....	.....	.....	.....	.....	4.9	4.2	2.5	4.3	3.0	4.9	4.8
21	.....	.....	.....	.....	.....	4.6	3.7	2.5	4.0	3.0	4.3	4.6
22	.....	.....	.....	.....	.....	4.3	3.4	2.4	4.6	2.9	4.2	4.8
23	.....	.....	.....	.....	.....	4.0	3.2	2.6	4.8	3.0	4.5	6.5
24	.....	.....	.....	.....	.....	4.5	5.8	3.5	5.0	2.9	4.2	17.5
25	.....	.....	.....	.....	.....	4.1	4.2	9.2	4.6	2.8	4.4	11.5
26	.....	.....	.....	.....	.....	4.0	6.0	6.0	4.0	2.8	4.3	9.1
27	.....	.....	.....	.....	.....	4.1	5.8	4.5	3.8	3.0	4.4	8.0
28	.....	.....	.....	.....	.....	3.8	4.2	3.8	3.5	5.4	4.5	7.5
29	.....	.....	.....	.....	.....	3.5	3.6	3.5	4.7	6.0	4.6	8.3
30	.....	.....	.....	.....	.....	3.7	3.3	3.3	5.0	4.8	4.2	8.5
31	.....	.....	.....	.....	.....	.....	3.1	3.1	.....	4.2	.....	8.0
1908.												
1	7.1	11.2	4.7	8.0	6.3	5.6	2.5	2.2	1.9	1.8	1.8	1.8
2	6.4	10.9	12.1	7.4	7.1	5.3	2.5	2.3	1.9	1.8	1.8	1.8
3	5.5	10.6	14.1	7.7	6.5	4.6	2.5	2.1	1.8	1.8	1.8	2.3
4	5.2	10.8	10.7	6.7	6.0	4.2	2.6	2.1	1.8	1.8	1.8	1.8
5	4.8	11.2	9.8	6.3	5.6	3.9	2.6	2.2	1.7	1.8	1.8	1.8
6	4.3	11.2	11.8	8.1	7.4	3.7	2.4	2.6	1.7	1.8	1.7	1.8
7	4.2	11.2	17.8	6.2	9.1	3.5	2.4	2.8	1.7	1.8	1.7	1.9
8	4.3	10.9	14.8	5.8	13.3	3.2	2.4	2.7	1.7	1.8	1.7	2.9
9	4.7	10.8	13.8	12.1	10.2	3.2	2.4	2.6	1.7	1.8	1.7	2.9
10	5.8	10.4	10.6	9.5	8.6	3.3	2.3	2.6	1.7	1.8	1.7	3.0
11	6.3	10.5	9.9	8.9	7.5	4.0	2.2	2.3	1.7	1.8	1.7	2.7
12	7.0	10.8	10.2	8.3	6.7	3.4	2.2	2.3	1.7	1.8	1.8	2.5
13	16.0	12.8	10.0	7.6	6.0	3.2	2.2	2.1	.....	1.8	1.8	2.5
14	12.0	14.0	10.8	6.9	5.6	3.0	2.2	2.1	1.7	1.7	1.8	2.5
15	8.7	20.3	10.9	6.7	5.5	2.9	2.6	2.1	1.7	1.7	2.2	2.3
16	7.8	21.4	13.1	7.2	7.9	3.9	2.6	2.0	1.7	1.7	2.0	2.2
17	6.9	11.8	9.8	6.7	8.8	4.0	2.4	2.0	1.7	1.7	2.2	2.3
18	6.2	8.8	10.6	5.9	9.0	3.5	2.2	2.1	1.6	1.7	2.0	2.8
19	5.8	7.8	30.1	12.1	7.2	3.7	2.2	2.4	1.6	1.7	1.8	7.0
20	5.3	6.7	17.9	10.2	13.4	3.2	2.2	2.4	1.6	1.7	1.8	5.1
21	5.0	6.0	11.9	7.1	10.1	3.6	2.2	2.7	1.6	1.7	1.8	3.8
22	5.7	5.6	9.6	6.4	8.2	3.7	3.2	2.6	1.6	1.7	.....	3.4
23	6.7	4.9	8.9	5.9	7.8	3.7	3.1	3.3	1.6	1.7	1.9	3.4
24	6.2	5.2	8.2	5.5	6.9	3.2	2.8	2.9	1.6	1.7	1.9	3.4
25	5.5	5.4	7.7	5.8	6.0	2.9	5.7	2.6	1.6	1.7	1.9	2.9
26	8.2	5.2	6.9	5.5	5.9	3.0	4.6	2.3	1.6	1.7	1.8	2.9
27	10.2	5.6	7.3	5.3	5.3	2.8	3.9	2.1	1.6	1.7	1.8	3.0
28	13.8	4.8	8.1	5.1	5.0	2.7	3.2	2.0	1.7	1.7	1.8	2.8
29	13.5	4.0	8.5	4.5	5.5	2.5	2.8	2.0	1.8	1.8	1.8	2.6
30	13.0	.....	10.1	4.3	6.6	2.5	2.6	1.9	1.8	1.8	1.8	2.6
31	11.6	.....	8.3	.....	5.6	.....	2.4	1.9	.....	1.8	.....	2.7

NOTE.—Ice conditions prevailed January 30 to February 14, 1908.

Rating table for Kiskiminetas River at Avonmore, Pa., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	65	3.50	1,040	5.80	3,430	16.00	26,050
1.70	95	3.60	1,120	6.00	3,690	17.00	29,200
1.80	128	3.70	1,200	6.20	3,950	18.00	32,480
1.90	163	3.80	1,280	6.40	4,210	19.00	35,830
2.00	200	3.90	1,360	6.60	4,470	20.00	39,290
2.10	240	4.00	1,450	6.80	4,730	21.00	42,790
2.20	282	4.10	1,540	7.00	5.000	22.00	46,350
2.30	326	4.20	1,630	7.20	5,280	23.00	50,000
2.40	372	4.30	1,720	7.40	5,570	24.00	53,800
2.50	420	4.40	1,820	7.60	5,870	25.00	57,700
2.60	470	4.50	1,920	7.80	6,180	26.00	61,600
2.70	525	4.60	2,020	8.00	6,500	27.00	65,500
2.80	580	4.70	2,130	9.00	8,180	28.00	69,400
2.90	640	4.80	2,240	10.00	10,050	29.00	73,300
3.00	700	4.90	2,350	11.00	12,230	30.00	77,300
3.10	765	5.00	2,460	12.00	14,740	31.00	81,300
3.20	830	5.20	2,700	13.00	17,430		
3.30	900	5.40	2,940	14.00	20,210		
3.40	970	5.60	3,180	15.00	23,050		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 18 discharge measurements made during 1907 to 1908, and is well defined between gage heights 1.6 feet and 15 feet.

Above 15.0 feet the extension of the discharge curve is based on the extension of the area and velocity curves. For illustration of the above rating, see figure 1, page 23.

Monthly discharge of Kiskiminetas River at Avonmore, Pa., for 1907 and 1908.

[Drainage area, 1,750 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
June 11-30	17,400	1,040	3,950	2.26	1.68	A.
July	4,470	765	1,800	1.03	1.19	A.
August	8,540	372	1,110	.634	.73	A.
September	8,180	580	2,380	1.36	1.52	A.
October	4,210	580	1,690	.966	1.11	A.
November	12,200	1,120	3,490	1.99	2.22	A.
December	30,800	900	5,160	2.95	3.40	A.
1908.						
January	26,000	1,630	6,250	3.57	4.12	A.
February	44,200	.....	5,900	3.37	3.64	B.
March	77,700	2,130	14,400	8.23	9.49	A.
April	15,000	1,720	5,520	3.15	3.51	A.
May	18,500	2,460	6,070	3.47	4.00	A.
June	3,180	420	1,130	.646	.72	A.
July	3,300	282	603	.345	.40	A.
August	900	163	353	.202	.23	A.
September	163	65	93.9	.054	.06	A.
October	128	95	112	.064	.07	A.
November	282	95	141	.081	.09	A.
December	5,000	128	716	.409	.47	A.
The year	77,700	65	3,440	1.97	26.80	

NOTE.—Discharge during the frozen period estimated on the basis of climatological data and general run-off conditions.

Discharge January 30 to 31, 1908, 7,000 second-feet; February 1 to 14, 1908, 2,110 second-feet.

BLACKLICK CREEK AT BLACKLICK, PA.

This station was established by the United States Geological Survey at the highway bridge about one-fourth mile from the railroad station August 16, 1904, was discontinued July 15, 1906, and was reestablished January 8, 1907, by the Water Supply Commission of Pennsylvania, by whom the records of gage heights and discharge measurements given below were furnished. Its purpose was to obtain data regarding the flow of Blacklick Creek for power development and for the study of flood and pollution prevention.

It is located about 6 miles above the junction of Blacklick Creek with Kiskiminetas River and is about 1 mile below the junction of Blacklick and Two Lick creeks.

The channel is obstructed by ice for short periods during the winter months. The datum of the gage has remained constant during the maintenance of the station.

During September, 1905, the original covered wooden bridge was torn down and replaced by a steel bridge. From September 1 to November 2, 1905, the gage readings were taken on a temporary gage 235 feet above the bridge, referred to the correct datum. On November 2 the chain gage was replaced on the new bridge. Construction work and changes in the abutments and pier changed the conditions of flow, requiring the use of a new rating curve beginning about September 1. The monthly discharge September 1, 1905, to April 9, 1906, has been revised and is republished below. The discharge for September and October, 1905, during the time that the temporary gage was used, is liable to some error, and the discharge April 10 to July 15, 1906, is suppressed owing to poor gage readings; otherwise all records of discharge for low and medium stages are excellent. The rating curve has not been developed above gage height 6 feet.

Discharge measurements of Blacklick Creek at Blacklick, Pa., in 1905–1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1905.					
November 2	E. C. Murphy	199	543	3.36	507
1906.					
May 23	Robert Follansbee	210	373	2.40	118
1907.					
May 27	R. J. Taylor	201	524	3.04	336
August 14 [a]	H. D. Padgett	98	177	2.22	47
September 12 [a]	A. H. Horton	207	776	4.35	1,290
1908.					
May 11	Kenneth Grant	205	759	4.23	1,150
July 24	do	199	609	3.41	529
August 22 [b]	R. H. Bolster	100	80	2.09	36.3
September 24 [c]	C. E. Ryder	28	33.4	1.89	6.8

[a] Section full of drift.
[b] Measured from coal tipple, one-third mile above bridge.
[c] Wading measurement.

Daily gage height, in feet, of Blacklick Creek at Blacklick, Pa., for 1907 and 1908.

[Observer, D. J. Walling.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	.....	3.5	3.25	3.75	3.5	2.85	3.45	2.35	2.1	3.45	3.1	2.9
2	.....	3.45	4.5	3.55	3.4	4.15	3.2	2.35	2.5	3.15	3.3	2.9
3	.....	4.25	4.4	3.4	3.25	3.6	3.0	2.3	3.6	3.0	5.25	2.8
4	.....	3.9	3.85	3.45	3.75	3.35	2.85	2.35	3.5	4.6	4.95	2.8
5	.....	3.65	3.7	3.5	3.85	3.55	2.7	2.3	3.15	4.8	4.45	2.8
6	.....	3.55	3.65	3.35	3.7	3.7	2.65	2.45	2.95	4.0	4.2	2.7
7	.....	3.95	3.4	3.2	3.8	3.55	2.95	2.55	2.75	3.6	5.75	2.7
8	4.65	4.85	3.55	3.3	3.7	3.35	3.1	2.4	2.6	4.3	4.95	2.7
9	4.95	4.7	3.4	3.35	4.25	3.15	2.75	2.3	2.55	4.3	4.65	2.75
10	4.8	4.7	3.45	3.4	4.35	3.0	2.7	2.5	2.65	3.8	4.25	4.35
11	4.4	4.65	3.45	3.3	4.1	3.25	2.65	2.45	4.8	3.55	3.95	5.4
12	6.1	4.6	3.65	3.35	3.75	4.6	3.1	2.35	4.6	3.6	3.7	4.4
13	6.1	4.6	12.0	3.45	3.65	4.15	3.1	2.3	3.65	3.45	3.45	3.85
14	8.4	4.6	13.2	3.55	3.45	5.9	2.75	2.25	3.25	3.15	3.35	3.85
15	7.1	4.6	8.0	3.5	3.35	4.75	2.6	2.2	3.05	3.0	3.15	3.9
16	5.85	4.6	5.95	3.85	3.4	4.2	2.5	2.2	2.85	2.95	3.05	3.75
17	5.2	4.35	5.4	3.9	3.3	3.8	2.55	2.2	2.85	2.85	3.0	3.55
18	4.8	4.05	5.65	3.7	3.15	3.55	2.65	2.2	2.95	2.8	3.0	3.5
19	9.4	3.95	6.2	3.65	3.1	3.35	2.6	2.15	3.25	2.7	3.2	3.35
20	8.1	4.25	9.0	3.6	3.05	3.25	2.5	2.1	3.25	2.7	3.1	3.15
21	5.85	4.05	6.1	3.6	2.95	3.15	2.45	2.15	3.25	2.75	3.1	3.05
22	4.8	3.75	5.05	3.5	2.9	3.0	2.4	2.15	3.7	2.7	3.1	3.05
23	4.15	3.6	4.6	3.4	2.8	3.3	2.35	2.15	3.55	2.6	3.0	6.6
24	3.7	3.5	4.2	4.4	2.8	3.0	2.35	2.45	3.55	2.6	3.0	7.25
25	4.05	3.4	3.95	4.1	2.8	2.9	2.5	2.65	3.3	2.6	3.0	5.45
26	3.8	3.45	3.85	3.9	2.95	2.9	2.85	2.45	3.05	2.5	3.0	4.75
27	3.35	3.35	5.15	3.75	3.05	3.0	2.95	2.3	2.9	2.8	3.0	4.35
28	3.65	3.55	5.0	3.55	3.05	2.85	2.75	2.25	2.85	4.6	2.95	4.55
29	3.95	.....	4.65	3.45	2.85	2.75	2.55	2.2	3.65	3.95	2.9	4.85
30	3.8	.....	4.3	3.4	2.75	3.55	2.4	2.2	3.8	3.5	2.9	4.4
31	3.6	.....	3.95	.....	2.7	.....	2.35	2.15	.....	3.25	.....	4.3
1908.[b]												
1	3.95	3.25	3.6	4.35	4.35	3.55	2.4	2.3	2.08	2.08	2.08	2.08
2	3.75	4.45	6.9	4.25	4.15	3.35	2.45	2.3	2.08	2.08	2.08	2.08
3	3.55	4.6	6.2	4.1	4.4	3.15	2.5	2.3	2.08	2.08	1.98	1.98
4	3.4	4.75	5.35	3.85	4.05	3.0	2.5	2.3	2.08	2.08	2.03	2.03
5	3.75	4.35	5.05	3.7	4.15	2.9	2.5	2.2	2.08	2.03	2.08	2.08
6	3.35	4.0	8.35	3.8	4.55	2.8	2.35	2.4	1.98	1.98	2.08	2.08
7	3.3	3.65	9.15	3.75	5.85	2.7	2.4	2.55	1.98	1.98	2.08	2.3
8	3.35	3.3	6.5	4.35	5.8	2.65	2.4	2.65	1.98	1.98	2.08	2.45
9	3.3	3.15	6.45	5.8	5.0	2.7	2.35	2.55	1.98	1.98	2.08	2.45
10	3.2	3.05	5.45	4.95	4.7	3.4	2.3	2.35	1.98	1.98	2.08	2.3
11	3.35	2.95	5.0	5.15	4.2	3.0	2.2	2.55	1.98	1.98	2.08	2.3
12	4.35	3.05	5.2	4.5	3.95	2.8	2.3	2.4	1.88	1.98	2.08	2.5
13	6.8	3.9	5.45	4.25	3.75	2.65	2.3	2.35	1.98	1.98	2.18	2.6
14	5.3	5.3	6.1	3.9	3.6	2.6	2.35	2.3	1.98	1.98	2.18	2.45
15	4.55	10.0	5.8	3.85	4.55	3.05	2.55	2.1	1.93	1.98	2.18	2.4
16	4.35	7.5	6.1	4.45	4.75	3.15	2.45	2.2	1.88	1.98	2.18	2.2
17	3.9	5.45	5.2	4.0	6.9	2.85	2.4	2.2	1.88	1.98	2.18	2.45
18	3.75	4.55	6.2	3.95	5.9	2.7	2.3	2.45	1.88	1.98	2.18	5.7
19	3.6	4.3	10.8	5.9	6.2	2.6	2.3	2.45	1.88	1.98	2.18	4.7
20	3.5	4.05	6.65	4.9	7.0	3.1	2.3	2.25	1.88	1.98	2.18	3.7
21	3.5	3.75	5.35	4.4	5.4	3.15	2.4	2.25	1.88	1.98	2.18	3.05
22	3.9	3.7	4.7	4.05	4.75	3.0	3.6	2.2	1.88	1.98	2.18	2.85
23	3.9	3.35	4.4	3.85	4.4	2.85	2.7	2.75	1.88	1.98	2.18	2.65
24	3.6	3.4	4.5	3.65	4.0	2.7	3.6	2.55	1.88	1.98	2.18	2.7
25	3.55	3.35	4.1	3.55	3.65	2.85	4.35	2.3	1.88	1.98	2.08	3.05
26	3.45	3.4	3.85	3.85	3.5	2.85	3.2	2.3	1.88	1.98	2.08	2.95
27	4.15	3.35	3.7	3.65	3.5	2.65	2.9	2.3	1.88	1.98	2.08	2.6
28	3.95	3.15	3.8	3.45	3.4	2.6	2.65	2.2	1.93	2.08	2.08	2.75
29	3.75	3.15	4.95	3.3	3.3	2.6	2.5	2.2	2.08	2.08	2.08	2.7
30	3.4	.....	4.95	3.4	3.2	2.5	2.4	2.05	2.08	2.08	2.08	2.65
31	3.2	.....	4.55	.....	3.75	.....	2.2	2.1	.....	2.08	.....	3.25

[a] Ice conditions probably prevailed about February 7 to 28 and perhaps for a few days also during the periods from January 25 to February 6 and March 1 to 12, 1907.

[b] Ice conditions prevailed February 2 to 14 and probably slight ice effect during December, 1908.

Rating table for Blacklick Creek at Blacklick, Pa., for September 1, 1905, to December 31, 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.88	6.0	3.10	365	4.50	1,420	6.80	4,130
1.89	6.8	3.20	415	4.60	1,520	7.00	4,410
1.90	7.5	3.30	470	4.70	1,620	7.20	4,690
2.00	21	3.40	525	4.80	1,720	7.40	4,970
2.10	38	3.50	590	4.90	1,820	7.60	5,250
2.20	59	3.60	660	5.00	1,930	7.80	5,550
2.30	83	3.70	730	5.20	2,150	8.00	5,850
2.40	110	3.80	805	5.40	2,370	9.00	7,570
2.50	140	3.90	885	5.60	2,600	10.00	9,250
2.60	172	4.00	965	5.80	2,840	11.00	11,050
2.70	205	4.10	1,050	6.00	3,090	12.00	12,950
2.80	240	4.20	1,140	6.20	3,350	13.00	14,950
2.90	280	4.30	1,230	6.40	3,610	14.00	17,050
3.00	320	4.40	1,320	6.60	3,870		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 9 discharge measurements made during 1905 to 1908 and is well defined below gage height 5 feet. Above this point the rating is only approximate.

The above rating supersedes all ratings previously published for the period September 1, 1905, to July, 1906.

Monthly discharge of Blacklick Creek at Blacklick, Pa., for 1905 to 1908.

[Drainage area, 403 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1905.						
September	3,740	38	349	0.866	0.97	B.
October	3,090	21	520	1.29	1.49	B.
November	5,400	240	710	1.76	1.96	A.
December	10,500	280	1,570	3.90	4.50	B.
1906.						
January	3,350	525	1,130	2.80	3.23	A.
February 21–28	730	240	468	1.16	.35	A.
March	5,550	205	1,140	2.83	3.26	A.
April 1–9	5,250	1,140	2,840	7.05	2.36	B.
1907.						
January	8,230	498	2,280	5.66	6.52	B.
February	.....	.....	515	1.28	1.33	D.
March	15,400	442	2,570	6.38	7.36	B.
April	1,320	415	651	1.62	1.81	A.
May	1,280	205	533	1.32	1.52	A.
June	2,960	222	680	1.69	1.89	A.
July	558	96	221	.548	.63	B.
August	186	38	86.0	.213	.25	C.
September	1,720	38	485	1.20	1.34	A.
October	1,720	140	579	1.44	1.66	A.
November	2,780	280	763	1.89	2.11	A.
December	2,370	205	1,060	2.63	3.03	A.
The year	15,400	38	869	2.16	29.45	
1908.						
January	4,130	415	894	2.22	2.56	A.
February	9,250	.....	1,060	2.63	2.84	B.
March	10,700	660	2,830	7.02	8.09	B.
April	2,960	470	1,160	2.88	3.21	A.
May	4,410	415	1,570	3.90	4.50	A.
June	625	140	283	.702	.78	A.
July	1,280	59	201	.499	.58	A.
August	222	30	95.5	.237	.27	B.
September	35	6.0	16.4	.041	.05	C.
October	35	18.3	22.9	.057	.07	C.
November	55	18.3	42.1	.104	.12	B.
December	2,720	18	302	.749	.86	C.
The year	10,700	6.0	706	1.75	23.93	

NOTE.—Ice conditions prevailed February 1 to 20, 1906. No discharge published after April 9, 1906, on account of inaccurate gage readings.

The above values of monthly discharge for 1905-6 supersede those previously published in Water-Supply Papers 169 and 205.

Discharge during the frozen periods and January 1 to 7, 1907, estimated on the basis of climatological reports and general run-off conditions in the Allegheny and Youghiogheny River drainages.

Discharge January 1 to 7, 1907, 2,000 second-feet; February 7 to 28, 1907, 450 second-feet; February 2 to 14, 1908, 392 second-feet.

MONONGAHELA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Monongahela and Allegheny rivers unite at Pittsburg to form Ohio River. The drainage basin of the Allegheny, which is much the larger, lies to the north; that of the Monongahela lies to the south. The drainage basin of Monongahela River lies in the States of Pennsylvania, Maryland, and West Virginia. The river is formed in the east central part of Marion County, W. Va., by the junction of Tygart and West Fork rivers; from this point it flows northeastward across the Pennsylvania state line to the mouth of Cheat River, thence northward, and joins Ohio River at Pittsburg, Pa. The important tributaries beginning at the head of the river and following down the east bank are Cheat and Youghiogheny rivers; on the west bank are Buffalo and Tenmile creeks, neither of which is of much importance. The total length of the river is 125 miles. The total drainage area is about 7,350 square miles.

The Tygart, also called Tygarts Valley River, drains the country to the southeast of the head of Monongahela River; the West Fork, the country to the southwest. Tygart River rises in the southern part of Randolph County, W. Va., flows in a general northerly direction, and joins the West Fork at Fairmont, W. Va. West Fork River rises in the western part of Upshur County, W. Va., flows northwestward into Lewis County, thence it flows in a slight northeasterly direction, and joins the Monongahela at Fairmont. The length of Tygart River is about 100 miles (map measurement); its drainage area above its mouth is about 1,420 square miles. The West Fork is about 70 miles (map measurement) in length; the drainage area above its mouth is about 845 square miles. The headwaters of these two streams drain the western slopes of the Allegheny Mountains.

In the upper portions the country is mountainous in character, the slopes of the valleys are steep and in many places precipitous, and the fall of the streams is rapid; farther down the country becomes less mountainous in character but remains very rolling. The steep slopes and rocky nature of the soil at the headwaters cause the heavy rains to run off rapidly, with but little absorption by the soil, thus producing sudden and intense floods, and a low flow in dry periods. The headwater regions are covered with fine growths of hardwood timber which are being rapidly lumbered. Below Fairmont the slope of the main stream is but little more than 1 foot per mile.

The drainage basin is exceptionally rich in natural resources, being underlain by very valuable and extensive coal beds and containing oil and gas in abundance. The country drained by Cheat and Youghiogheny rivers is of the same character as that drained by Tygart and West Fork rivers, being mountainous and rough at the

headwaters, losing the mountainous character as the rivers are descended, and continuing rolling and hilly to the junctions with the main stream.

Monongahela River is navigable its entire length by means of locks and dams.

The elevation of the sources of the West Fork is 1,500 feet; of the Tygart is 3,500 feet; at Fairmont the elevation is 860 feet; at the mouth of the river at Pittsburg the elevation is 707 feet.

This basin was at one time covered with forests, but the greater part has been cut off. There is still timber at the headwaters, but the area of timbered land is small when compared to the total area of drainage basin.

The mean annual rainfall on that portion of the basin in West Virginia is from 45 to 50 inches. On the portion in Pennsylvania, it is 40 to 45 inches. The winter conditions in the southern part of the basin are comparatively mild. The snowfall is light and does not last long, and ice does not form very thick. In the northern part of the basin ice forms about a foot in thickness during severe winters, but in ordinary winters it is not very thick, and it causes little trouble in floods. The tributaries of Monongahela River afford a number of reservoirs, some of which would store an immense quantity of water.

Fuel is so cheap and abundant in the drainage basin that little water power has been developed, although the main stream and its tributaries afford good opportunities. At the dams on the main stream a fall of about 140 feet is available for use. The low flow during dry spells is an unfavorable condition for water power development.

The following gaging stations have been maintained in this drainage basin:

Tygart River at Belington, W. Va., 1907–1908.
Tygart River at Fetterman, W. Va., 1907–1908.
Monongahela River at Lock No. 4, Pa., 1886–1906. Flood stage record only.
Buckhannon River at Hall, W. Va., 1907–1908.
West Fork River at Enterprise, W. Va., 1907–1908.
Buffalo Creek at Barrackville, W. Va., 1907–1908.
Cheat River at Morgantown, W. Va., 1899–1900; 1902–1905; 1908.
Youghiogheny River at Friendsville, Md., 1898–1904.
Youghiogheny River at Confluence, Pa., 1904–1908.
Casselman River at Confluence, Pa., 1904–1908.
Laurel Hill Creek at Confluence, Pa., 1904–1908.
Indian Creek at Westmoreland County, Pa., 1892–1893.

TYGART RIVER AT BELINGTON, W. VA.

This station is located at the highway bridge at Belington, W. Va. It was established June 5, 1907, to obtain data connected with the study of water power, water supply, pollution, flood control, and storage problems.

In general the winters are mild. The station has not been maintained long enough to determine definitely the ice conditions.

The records are reliable and accurate; the datum of the gage has remained unchanged.

Discharge measurements of Tygart River at Belington, W. Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 5	A. H. Horton	189	604	4.50	856
June 6	C. E. Langley	196	838	5.54	1,640
June 7	A. H. Horton	193	718	4.99	1,200
August 12	Horton and Padgett	186	468	3.73	459
September 16	A. H. Horton	174	349	3.14	233
1908.					
August 2	W. G. Hoyt	180	303	2.87	147

Daily gage height, in feet, of Tygart River at Belington, W. Va., for 1907 and 1908.

[Observers, Charles Brandenburg and S. A. Campbell.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							3.5	3.9	3.0	3.2	4.1	3.9
2							3.9	3.4	3.1	3.1	4.0	3.7
3							5.6	3.3	3.2	3.0	5.2	3.5
4							5.1	3.1	3.5	3.1	6.3	3.4
5						4.5	4.1	3.3	4.6	5.6	5.9	3.6
6						5.6	3.5	3.4	4.1	4.8	5.3	3.7
7						5.0	3.7	3.2	3.5	4.2	8.2	3.6
8						4.8	4.1	3.2	3.1	4.9	7.1	3.5
9						10.8	4.7	2.9	3.0	5.8	6.3	3.4
10						6.7	9.2	3.5	2.8	5.2	6.6	5.2
11						5.4	5.9	4.0	3.1	4.3	7.3	8.9
12						5.0	7.6	3.7	4.0	4.0	6.1	6.3
13						9.3	8.1	3.4	4.1	3.6	5.3	5.4
14						10.1	7.9	3.2	3.6	3.4	4.4	6.0
15						11.7	5.1	3.1	3.3	3.3	4.2	9.3
16						11.2	4.1	3.0	3.2	3.1	3.9	7.1
17						5.3	7.1	3.2	3.4	3.1	3.8	6.2
18						4.9	18.7	3.5	3.2	3.2	3.6	5.1
19						4.0	6.2	3.3	4.9	3.1	3.5	4.7
20						3.9	5.6	3.2	4.1	3.0	3.4	4.5
21						3.8	5.0	3.0	3.7	2.9	3.2	4.2
22						3.5	4.1	2.8	3.4	2.9	3.3	3.9
23						3.4	4.5	3.1	3.1	2.8	3.4	4.1
24						3.3	4.4	10.0	3.5	2.8	6.1	9.3
25						4.4	4.6	8.6	3.8	2.8	7.8	7.1
26						4.1	4.6	4.9	3.2	2.7	6.2	6.0
27						3.7	4.5	4.1	3.0	2.9	5.3	4.7
28						3.5	4.1	3.8	2.9	3.5	4.6	4.3
29						3.4	5.1	3.5	3.0	6.5	4.3	4.2
30						3.2	4.8	3.3	3.1	6.2	3.9	4.7
31							4.6	3.2		5.8		5.1

Daily gage height, in feet, of Tygart River at Belington, W. Va., for 1907 and 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	4.9	4.3	4.4	10.1	3.8	4.7	2.5	3.0	2.2	1.9	1.8	2.1
2	4.7	6.1	12.3	7.8	3.9	4.1	2.4	2.8	2.2	1.9	1.8	2.1
3	4.5	5.9	9.1	7.0	4.1	3.9	2.3	2.2	2.2	1.9	1.9	2.1
4	4.2	5.5	6.9	5.8	4.3	4.0	3.1	2.6	2.1	1.8	1.8	2.1
5	4.4	5.3	5.6	4.9	8.9	6.3	4.6	2.9	2.1	1.8	2.0	2.1
6	4.6	7.1	6.2	4.6	10.8	4.9	3.8	3.2	2.1	1.8	2.1	2.2
7	4.3	7.3	8.5	4.3	7.9	4.2	3.4	2.7	2.1	1.8	2.2	2.2
8	6.2	6.2	7.3	4.4	10.7	3.9	3.2	2.7	2.1	1.8	2.1	2.2
9	6.9	5.7	7.0	7.5	7.8	3.5	3.1	2.8	2.0	1.8	2.0	2.2
10	6.7	4.8	6.8	7.7	10.9	3.3	3.0	2.9	2.0	1.8	2.0	2.2
11	6.4	4.6	6.4	8.9	10.4	3.1	2.9	2.8	2.0	1.8	2.0	2.3
12	10.0	6.2	5.3	8.7	6.7	3.2	2.6	2.9	2.0	1.8	2.0	2.5
13	11.5	9.1	4.9	6.6	5.6	3.1	2.7	2.6	2.0	1.8	2.0	2.8
14	8.2	10.5	4.6	5.3	4.5	3.0	2.6	2.5	2.0	1.7	2.0	3.0
15	5.9	10.4	4.5	4.7	4.3	3.2	3.0	2.4	2.0	1.7	2.0	2.9
16	5.1	12.9	4.6	5.1	5.8	3.3	2.8	2.3	2.0	1.7	2.0	2.7
17	4.8	7.1	4.5	6.7	.....	3.4	2.6	2.3	1.9	1.8	2.0	2.6
18	4.5	6.2	4.7	5.6	4.2	3.0	3.0	2.3	1.9	1.8	2.0	2.5
19	4.3	5.3	5.8	5.8	4.7	2.9	3.4	2.2	1.9	1.8	2.0	2.5
20	4.2	5.2	8.3	6.5	7.3	3.1	2.9	2.2	1.9	1.8	2.0	2.8
21	4.3	4.9	6.5	5.7	8.2	3.2	2.8	2.2	1.9	1.8	2.0	3.0
22	4.5	4.4	5.1	4.8	7.4	3.3	3.2	2.2	1.9	1.8	2.0	2.7
23	5.9	4.1	4.8	4.5	6.2	3.1	3.2	2.2	1.8	1.8	2.0	2.8
24	5.6	4.0	4.7	3.9	4.9	3.0	3.3	2.2	1.8	1.8	2.0	2.7
25	5.4	3.8	4.5	3.8	4.6	2.9	3.9	2.0	1.8	1.8	2.0	2.6
26	4.2	3.9	4.3	4.1	6.4	2.9	5.9	2.3	1.8	1.8	2.0	2.6
27	6.3	4.5	4.0	4.2	5.2	2.8	6.9	2.3	1.8	1.8	2.0	2.6
28	6.6	4.3	4.1	4.3	4.5	2.8	4.6	2.4	1.8	1.8	2.0	2.6
29	5.7	4.0	4.6	4.0	4.1	2.7	4.1	2.6	1.8	1.8	2.0	2.6
30	5.4	.....	6.5	3.9	8.3	2.6	3.6	2.5	1.9	1.9	2.1	2.6
31	4.5	.....	6.4	.....	6.2	.....	3.3	2.3	.....	1.8	.....	2.9

TYGART RIVER AT FETTERMAN, W. VA.

This station is located at the highway bridge at Fetterman, W. Va. It was established June 3, 1907, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Lost Otter Creek enters from the west about one-half mile below the station.

The winters are mild; ice does not form very thick and does not last long. The records are reliable and accurate; the datum of the gage has not been changed.

Discharge measurements of Tygart River at Fetterman, W. Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 3	A. H. Horton	271	1,890	5.68	3,100
June 8	do	271	1,970	6.02	3,790
August 10	Horton and Padgett	271	1,800	5.39	2,480
September 15	A. H. Horton	265	1,500	4.30	794

Daily gage height, in feet, of Tygart River at Fetterman, W. Va., for 1907 and 1908.

[Observer, Joseph Gerken.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	5.15	4.5	4.3	4.12	5.4	4.85
2	.....	.....	.....	.....	.....	.....	6.3	4.4	4.25	4.1	5.5	4.75
3	.....	.....	.....	.....	.....	5.7	6.6	4.3	4.25	4.08	7.4	4.7
4	.....	.....	.....	.....	.....	5.6	5.5	4.28	4.25	4.1	7.75	4.55
5	.....	.....	.....	.....	.....	5.4	4.9	4.15	4.65	6.05	6.95	4.5
6	.....	.....	.....	.....	.....	6.6	4.55	4.65	5.0	7.4	6.65	4.35
7	.....	.....	.....	.....	.....	6.35	4.55	4.6	4.6	5.55	8.85	4.3
8	.....	.....	.....	.....	.....	6.05	4.45	4.4	4.4	5.7	8.95	4.2
9	.....	.....	.....	.....	.....	10.9	4.8	4.5	4.25	8.65	7.6	4.45
10	.....	.....	.....	.....	.....	8.8	9.1	5.25	4.5	6.8	7.05	6.75
11	.....	.....	.....	.....	.....	6.3	8.25	6.1	4.7	5.6	6.9	11.8
12	.....	.....	.....	.....	.....	6.0	8.15	5.05	4.95	5.15	6.6	8.4
13	.....	.....	.....	.....	.....	6.4	8.15	4.6	4.65	4.9	6.0	6.55
14	.....	.....	.....	.....	.....	13.3	7.2	4.35	4.45	4.75	5.5	8.0
15	.....	.....	.....	.....	.....	12.6	5.9	4.15	4.35	4.65	5.15	9.95
16	.....	.....	.....	.....	.....	8.95	5.3	4.0	4.15	4.55	4.95	9.05
17	.....	.....	.....	.....	.....	6.5	12.7	4.0	4.05	4.48	4.75	7.0
18	.....	.....	.....	.....	.....	5.7	19.8	4.0	4.15	4.35	4.6	6.15
19	.....	.....	.....	.....	.....	5.25	15.6	4.15	5.05	4.15	5.0	5.75
20	.....	.....	.....	.....	.....	4.75	9.15	4.05	5.0	4.12	5.0	5.45
21	.....	.....	.....	.....	.....	4.7	6.75	3.95	4.55	4.12	5.0	5.05
22	.....	.....	.....	.....	.....	4.55	5.6	3.88	4.5	4.1	4.9	4.95
23	.....	.....	.....	.....	.....	4.55	5.45	4.15	4.4	4.02	4.8	5.75
24	.....	.....	.....	.....	.....	4.5	5.85	8.6	4.45	3.98	6.6	8.75
25	.....	.....	.....	.....	.....	5.45	6.45	11.2	4.35	3.9	8.0	8.3
26	.....	.....	.....	.....	.....	4.55	5.75	9.1	4.3	3.8	7.2	6.5
27	.....	.....	.....	.....	.....	4.5	5.75	6.2	4.15	3.9	6.4	5.6
28	.....	.....	.....	.....	.....	4.45	5.0	5.45	4.05	5.4	5.65	5.45
29	.....	.....	.....	.....	.....	4.25	4.55	4.9	4.1	7.7	5.45	5.4
30	.....	.....	.....	.....	.....	4.3	4.8	4.75	4.2	6.55	5.1	5.25
31	.....	.....	.....	.....	.....	.....	4.85	4.45	.....	5.75	.....	5.35
1908.												
1	5.4	5.55	5.95	11.0	4.65	5.6	3.6	4.35	3.25	2.6	2.4	2.7
2	5.35	5.5	13.35	10.25	4.75	5.0	3.6	3.85	3.2	2.6	2.4	2.7
3	5.15	5.55	11.05	8.55	4.95	4.75	3.6	3.65	3.25	2.55	2.35	2.7
4	5.05	5.9	8.2	7.2	5.7	4.8	3.5	3.6	3.25	2.5	2.3	2.75
5	5.1	6.15	6.7	5.95	12.75	5.4	3.6	3.6	3.2	2.5	2.3	2.8
6	5.02	10.1	7.2	5.65	13.0	5.5	4.3	3.55	3.15	2.5	2.3	2.9
7	4.95	8.4	9.2	5.35	11.55	4.85	4.35	3.5	3.1	2.5	2.3	2.95
8	4.95	6.6	8.4	5.4	13.45	4.55	4.25	3.8	3.08	2.45	2.3	3.1
9	4.75	5.7	12.1	8.35	10.6	4.4	4.1	4.0	3.02	2.4	2.3	3.1
10	4.65	5.5	10.15	8.55	12.55	4.2	3.95	3.7	3.0	2.4	2.3	3.0
11	4.7	5.25	8.25	9.65	11.85	4.18	3.8	3.65	2.98	2.4	2.4	3.0
12	8.8	5.75	6.7	11.25	8.55	4.12	3.6	3.65	2.92	2.45	2.4	3.25
13	14.1	9.1	6.15	8.85	6.3	4.1	3.65	3.6	2.9	2.55	2.4	3.65
14	10.2	10.65	5.75	6.6	5.8	3.95	3.95	3.6	2.9	2.55	2.4	3.75
15	7.0	13.25	5.6	5.85	5.75	4.0	3.95	3.6	2.85	2.5	2.45	3.85
16	6.25	14.3	5.5	5.85	5.5	4.45	3.85	3.55	2.8	2.5	2.5	4.0
17	5.95	9.65	5.5	6.45	5.95	4.55	3.85	3.5	2.8	2.5	2.5	3.85
18	5.65	6.85	5.45	6.7	5.85	4.2	4.1	3.5	2.7	2.5	2.5	3.7
19	5.55	6.55	8.85	6.3	6.65	4.05	4.45	3.5	2.7	2.45	2.5	3.65
20	5.15	7.1	9.5	6.8	7.6	3.95	4.5	3.45	2.7	2.4	2.5	3.8
21	5.0	6.45	7.7	6.9	11.55	3.85	4.15	3.4	2.7	2.4	2.55	3.7
22	5.2	5.9	6.6	5.95	9.05	3.8	4.05	3.4	2.7	2.4	2.6	3.75
23	5.82	5.65	5.9	5.4	7.25	3.85	4.45	3.35	2.7	2.4	2.6	3.75
24	5.85	5.35	5.8	5.15	6.25	4.0	4.7	3.3	2.7	2.4	2.6	3.7
25	5.3	5.2	5.6	5.0	5.7	3.95	5.15	3.3	2.7	2.4	2.6	3.7
26	5.2	5.7	5.4	4.85	5.85	3.9	6.7	3.3	2.7	2.35	2.7	3.65
27	7.45	6.25	5.3	4.75	5.55	3.85	7.45	3.3	2.7	2.3	2.7	3.6
28	7.95	5.9	5.15	4.7	5.15	3.8	6.3	3.2	2.7	2.3	2.7	3.6
29	6.9	5.6	5.6	4.55	4.8	3.75	5.55	3.2	2.65	2.35	2.7	3.55
30	6.0	.....	7.75	4.5	4.55	3.7	5.1	3.15	2.6	2.4	2.7	3.55
31	5.5	.....	9.2	.....	6.6	.....	4.85	3.1	.....	2.4	.....	3.65

BUCKHANNON RIVER AT HALL, W. VA.

This station is located at the highway bridge at Hall, W. Va. It was established June 7, 1907, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Pecks Run is tributary on the left bank about a mile below the station.

When this station was established, it was thought that the dam and mill at Boulder, a few miles below, had been abandoned, and that backwater effect, being constant, would not vitiate the gage readings. Some time during the summer of 1908 the dam was repaired, thus raising the water about 1 foot in the pond above the dam. It is believed that the gage readings from the date of establishment until the latter part of November, 1908, are but little modified by backwater effect, but this is not certain, and the records should be used with caution, especially for low stages. A small power plant, used principally for grinding grain, is located a short distance above the station, and this plant may modify the low water flow to a slight extent.

Winter conditions are mild, and ice causes little trouble.

Except as above indicated, the records are reliable and accurate. The datum of the gage has remained unchanged.

Discharge measurements of Buckhannon River at Hall, W. Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 7	A. H. Horton	108	484	5.32	867
August 12	Horton and Padgett	108	329	4.10	273
September 16	A. H. Horton	102	285	3.54	138
1908.					
August 1	W. G. Hoyt	100	286	3.53	147

Daily gage height, in feet, of Buckhannon River at Hall, W. Va., for 1907 and 1908.

[Observer, James Newcomb.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							5.6	4.1	3.9	3.2	4.9	4.3
2							6.6	4.0	3.7	3.3	4.7	4.3
3							5.6	4.0	3.6	3.3	6.4	4.1
4							4.7	3.8	3.9	3.3	6.7	4.1
5							4.4	3.7	4.7	5.3	6.0	4.0
6							3.9	3.6	4.3	6.1	5.5	3.9
7						5.3	3.9	4.1	4.0	4.9	6.5	3.8
8						7.6	5.0	3.9	3.8	4.5	6.8	4.0
9						10.5	4.3	3.9	3.7	7.9	6.1	4.0
10						7.3	10.3	5.0	3.6	5.9	6.0	4.8
11						5.7	7.2	4.9	3.6	5.0	6.9	9.8
12						5.2	6.0	4.1	3.6	4.5	6.0	7.5
13						7.3	8.5	3.9	4.0	4.3	5.4	5.9
14						10.6	6.4	3.8	3.9	4.1	5.1	6.6
15						9.9	5.3	3.7	3.7	4.1	4.6	8.8

Daily gage height, in feet, of Buckhannon River at Hall, W. Va., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	.....	.....	.....	.....	.....	7.1	5.3	3.5	3.6	4.0	4.4	7.2
17	.....	.....	.....	.....	.....	5.9	5.1	3.6	3.5	3.9	4.2	6.2
18	.....	.....	.....	.....	.....	5.0	13.3	4.0	3.5	3.9	4.2	5.5
19	.....	.....	.....	.....	.....	4.6	11.5	3.9	3.4	3.8	4.3	5.2
20	.....	.....	.....	.....	.....	4.2	7.1	3.7	3.4	3.8	4.4	4.9
21	.....	.....	.....	.....	.....	4.2	5.7	3.5	3.4	3.7	4.3	4.6
22	.....	.....	.....	.....	.....	3.9	4.8	3.4	3.5	3.6	4.2	4.5
23	.....	.....	.....	.....	.....	3.8	5.5	3.4	3.4	3.6	4.1	4.5
24	.....	.....	.....	.....	.....	4.2	5.6	8.3	3.4	3.5	5.9	6.1
25	.....	.....	.....	.....	.....	4.0	4.8	10.1	3.5	3.5	6.9	6.5
26	.....	.....	.....	.....	.....	3.8	4.4	8.9	3.4	3.5	6.0	5.8
27	.....	.....	.....	.....	.....	3.8	4.3	5.8	3.3	3.5	5.4	5.3
28	.....	.....	.....	.....	.....	4.0	4.2	4.9	3.2	4.3	5.0	4.9
29	.....	.....	.....	.....	.....	3.7	3.9	4.4	3.1	7.3	4.6	4.8
30	.....	.....	.....	.....	.....	3.8	4.3	4.2	3.3	6.0	4.4	4.7
31	.....	.....	.....	.....	.....	.....	4.2	4.0	.....	5.3	.....	4.6
1908.												
1	4.5	6.0	4.8	9.1	4.0	4.7	2.3	3.6	2.0	1.5	1.4	1.6
2	4.5	8.9	9.7	8.5	4.0	4.2	2.2	3.4	2.0	1.5	1.4	1.6
3	4.4	8.7	8.4	7.0	4.3	4.0	2.2	3.2	2.0	1.4	1.4	1.7
4	4.3	8.5	6.7	5.7	4.4	3.9	2.4	2.9	2.0	1.5	1.4	1.7
5	4.3	8.2	5.8	5.2	8.4	4.3	3.3	2.6	1.9	1.5	1.4	1.7
6	4.5	13.8	6.1	4.9	9.5	4.1	3.8	2.5	1.9	1.5	1.4	1.8
7	4.3	8.3	7.7	4.8	7.5	3.9	3.5	3.7	1.9	1.5	1.4	1.9
8	4.3	6.0	6.5	4.6	9.2	3.7	3.4	3.8	1.9	1.5	1.4	1.9
9	4.6	5.1	7.8	6.6	7.4	3.5	3.2	3.6	1.8	1.5	1.4	1.8
10	4.3	5.0	8.2	7.2	10.55	3.4	3.1	3.3	1.8	1.5	1.4	1.9
11	4.2	4.7	6.6	8.5	10.2	3.4	2.8	3.5	1.8	1.5	1.4	2.0
12	6.3	4.6	5.9	10.1	6.7	3.7	2.5	3.3	1.7	1.5	1.4	2.2
13	9.5	5.6	5.4	7.0	5.6	3.5	2.3	3.1	1.7	1.5	1.4	2.6
14	6.7	7.4	5.2	5.8	5.0	3.3	2.5	2.8	1.7	1.4	1.4	3.9
15	6.0	8.3	4.9	5.2	4.6	3.5	2.8	2.5	1.7	1.4	1.5	3.5
16	5.5	11.1	5.0	5.5	5.2	3.9	3.5	2.3	1.7	1.4	1.5	3.2
17	5.2	7.6	4.8	6.0	5.0	3.9	3.2	2.3	1.7	1.4	1.6	2.7
18	5.0	6.0	4.8	5.5	4.6	3.5	4.0	2.3	1.7	1.4	1.6	2.5
19	4.8	5.7	5.0	5.6	4.7	3.4	4.4	2.2	1.6	1.4	1.5	2.3
20	4.5	6.2	7.2	6.2	5.9	3.4	3.8	2.2	1.6	1.4	1.5	2.5
21	4.3	5.7	6.2	5.8	8.2	3.2	3.6	2.1	1.6	1.4	1.5	3.0
22	4.5	5.4	5.5	5.2	6.8	3.4	4.1	2.1	1.6	1.4	1.5	3.1
23	4.7	4.9	5.2	4.8	5.8	3.5	4.3	2.1	1.6	1.4	1.5	3.2
24	4.9	4.7	5.0	4.6	5.2	3.4	3.8	2.1	1.6	1.4	1.5	2.8
25	4.7	4.6	4.9	4.4	4.8	3.3	4.2	2.1	1.5	1.4	1.5	2.7
26	4.7	4.5	4.8	4.3	4.9	3.2	5.7	2.1	1.5	1.4	1.6	2.5
27	6.5	5.5	4.6	4.2	4.7	3.1	5.4	2.1	1.5	1.4	1.6	2.8
28	7.8	5.4	4.4	4.0	4.3	3.0	5.3	2.1	1.5	1.4	1.6	3.4
29	6.2	4.9	4.7	3.9	4.1	2.7	4.5	2.1	1.6	1.5	1.6	3.4
30	6.0	.....	8.2	3.8	4.0	2.5	4.1	2.0	1.5	1.5	1.6	3.4
31	6.0	.....	7.2	.....	5.6	.....	3.8	2.0	.....	1.4	.....	3.5

WEST FORK RIVER AT ENTERPRISE, W. VA.

This station, which is located at the highway bridge at Enterprise, W. Va., was established June 2, 1907, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Bingamon Creek is tributary from the west about 1 mile below the station.

Winter conditions are mild and ice does not form very thick, if at all.

A small dam is located at Worthington about 3 miles below the station, but backwater does not reach to the section, for, from December 5 to 12, 1908, when the gates at the dam were opened to let water out of the pond, no effect was produced at the gage. The gage reader states that during the summer of 1908 the only water running in the river was the pumpage from the numerous coal mines along the stream.

The datum of the gage has remained unchanged; the records are reliable and accurate.

Discharge measurements of West Fork River at Enterprise, W. Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 2	A. H. Horton	171	825	4.94	2,260
June 8	do	156	558	3.44	1,010
August 10	Horton and Padgett	161	718	4.20	1,600
September 13	A. H. Horton	157	500	3.04	617

Daily gage height, in feet, of West Fork River at Enterprise, W. Va., for 1907 and 1908.

[Observer, Charles M. Tetrick.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.6	2.1	2.0	2.0	3.6	2.6
2						4.9	3.0	2.0	1.9	2.0	8.4	2.4
3						4.8	3.9	2.0	1.8	2.1	6.3	2.3
4						3.8	3.6	1.9	2.7	2.2	5.5	2.2
5						3.2	3.1	1.9	2.5	4.7	5.0	2.1
6						3.6	2.0	1.9	2.3	4.0	4.6	2.0
7						3.5	3.5	2.3	2.0	3.5	4.2	2.0
8						3.2	3.5	2.2	1.9	4.3	4.0	1.9
9						4.8	8.4	2.0	1.8	3.6	3.7	2.1
10						4.5	5.0	4.2	1.7	3.2	3.5	2.6
11						3.3	9.6	3.6	4.5	3.0	3.1	9.7
12						2.9	7.5	2.9	6.5	2.8	2.8	7.5
13						5.1	4.8	2.5	4.5	2.6	2.4	6.0
14						9.4	3.2	2.1	3.0	2.3	2.3	8.5
15						6.4	3.0	2.0	2.8	2.1	2.2	9.0
16						4.5	2.9	2.0	2.5	2.1	2.2	7.0
17						3.5	2.5	1.9	2.1	2.0	2.1	6.3
18						2.9	9.5	1.8	2.0	1.9	2.4	5.1
19						2.6	8.5	2.0	3.0	1.9	3.6	4.0
20						2.4	4.9	2.3	3.1	1.8	3.5	3.8
21						2.3	4.2	2.1	2.6	1.8	3.3	3.5
22						2.2	3.1	2.0	2.4	1.7	3.0	3.0
23						2.0	4.6	3.0	2.2	1.6	2.8	2.8
24						1.8	3.8	8.2	2.1	1.5	10.5	4.8
25						1.6	3.5	6.8	2.0	1.4	8.5	4.0
26						1.7	3.8	5.6	2.0	1.4	5.4	3.8
27						1.7	3.1	4.2	2.0	1.5	4.5	3.5
28						1.7	2.7	3.5	1.8	3.6	3.2	3.1
29						1.8	2.3	2.6	1.9	5.4	3.0	2.9
30						1.6	2.2	2.4	2.0	4.5	2.7	3.0
31							2.0	2.1		3.3		2.6
1908.												
1	2.4	3.8	9.0	8.7	2.0	2.4	1.6	1.9	1.0	.8	.8	.8
2	2.3	3.6	14.0	10.4	3.0	2.2	1.4	1.8	.9	.7	.8	.8
3	2.2	3.4	8.0	8.0	2.6	2.0	1.3	2.5	.8	.8	.8	.8
4	2.0	3.3	6.5	6.4	5.0	1.9	1.2	2.0	.7	.8	.8	.8
5	3.0	15.0	5.0	4.4	16.4	1.8	1.1	1.6	.8	.8	.8	.8

Daily gage height, in feet, of West Fork River at Enterprise, W. Va., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
6	2.8	7.7	6.0	3.5	11.4	1.7	1.1	2.6	0.8	0.9	0.8	0.8
7	2.7	5.5	5.4	3.4	10.5	1.6	1.1	2.1	.8	.8	.8	.8
8	2.6	4.6	5.0	3.2	8.2	1.5	1.8	2.0	.8	.8	.8	.8
9	4.2	4.2	13.5	6.8	10.0	1.5	1.6	1.9	.7	.8	.8	1.3
10	4.0	4.0	9.6	6.3	9.5	1.4	1.4	1.8	.6	.7	.8	1.1
11	4.2	3.7	6.3	6.5	7.1	1.3	1.3	1.6	.9	.8	.8	1.0
12	4.6	3.3	4.7	5.5	5.2	1.2	1.2	1.4	.8	.8	.8	1.0
13	9.9	3.1	4.1	4.5	4.0	1.0	1.1	1.3	.7	.8	.8	1.1
14	7.6	3.0	3.7	4.0	3.2	1.0	1.6	1.3	.6	.8	.8	1.0
15	5.2	8.3	3.5	3.7	3.1	3.1	1.4	1.2	.7	.8	.8	1.2
16	4.8	8.0	3.3	3.3	2.8	2.6	1.5	1.1	.7	.8	.8	1.1
17	4.5	6.4	3.1	3.2	3.2	2.2	1.3	1.3	.9	.8	.8	1.0
18	4.1	4.3	3.0	3.2	3.9	2.0	2.8	1.1	.9	.8	.8	.9
19	3.8	4.0	11.8	3.0	5.3	1.9	2.0	1.0	.9	.8	.8	1.2
20	3.4	6.1	7.6	2.9	5.1	1.7	2.9	1.0	.8	.8	.8	1.1
21	3.1	5.0	5.1	3.1	10.6	1.5	2.2	.9	.8	.8	.8	1.1
22	3.0	4.5	4.5	2.7	5.6	1.4	2.0	1.0	.9	.8	.8	1.2
23	2.9	4.0	3.9	2.5	4.7	1.3	1.8	1.1	.8	.9	.8	1.1
24	2.8	3.8	3.4	2.4	4.0	1.2	1.5	1.0	.7	.9	.8	1.1
25	2.8	3.6	3.1	2.3	3.7	1.3	1.4	.9	.6	.9	.8	1.0
26	3.5	5.7	3.4	2.2	3.6	1.2	1.6	.9	.8	.9	.8	1.0
27	6.7	5.2	3.2	2.2	3.5	1.1	2.5	.8	.9	.9	.8	1.6
28	5.0	4.8	3.0	2.1	3.0	1.1	2.3	.8	.8	.9	.8	1.3
29	4.6	4.5	6.5	2.0	2.8	1.9	2.1	.8	.7	.8	.8	1.2
30	4.2	.....	7.0	1.9	2.5	1.7	2.0	.8	.8	.8	.8	1.1
31	4.0	.....	7.0	.....	2.3	.....	2.0	.7	.....	.8	.....	1.0

BUFFALO CREEK AT BARRACKVILLE, W. VA.

This station, which was established June 3, 1907, to obtain data for studying water power, flood control, and storage problems, is located at the iron highway bridge, about one-third mile above the covered wooden bridge at Barrackville, W. Va. The bridge is about 2¾ miles from Fairmont, and is about 4 miles above the mouth of the creek. Finches Run is tributary from the north about one-third mile below the station.

The winters are mild at this station and ice causes little or no trouble. The datum of the gage has remained unchanged. The records are reliable and accurate.

The station was discontinued December 31, 1908, as the stream is dry in summer.

Discharge measurements of Buffalo Creek at Barrackville, W. Va., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 3	A. H. Horton	92	181	2.73	275
June 4	do	87	141	2.36	194
August 10	Horton and Padgett	90	193	2.79	303
September 13	A. H. Horton	69	90	1.79	58

Daily gage height, in feet, of Buffalo Creek at Barrackville, W. Va., for 1907 and 1908.

[Observer, Miss Ethel Bert Motter.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	1.4	1.8	1.3	1.4	1.7	1.9
2	.....	.....	.....	.....	.....	.....	2.8	1.6	1.3	1.4	1.8	1.9
3	.....	.....	.....	.....	.....	2.7	1.9	1.7	1.4	1.4	5.4	1.7
4	.....	.....	.....	.....	.....	2.4	1.6	1.4	2.9	1.3	3.3	1.7
5	.....	.....	.....	.....	.....	2.8	1.4	1.4	2.0	2.5	2.6	1.8
6	.....	.....	.....	.....	.....	3.0	1.5	3.1	1.7	2.0	2.3	2.2
7	.....	.....	.....	.....	.....	2.4	1.5	2.2	1.5	1.7	2.5	1.7
8	.....	.....	.....	.....	.....	2.3	1.3	2.1	1.5	1.7	2.3	1.6
9	.....	.....	.....	.....	.....	2.0	1.4	1.7	1.4	1.5	2.1	1.6
10	.....	.....	.....	.....	.....	1.8	1.5	3.0	1.4	2.1	1.9	1.9
11	.....	.....	.....	.....	.....	1.7	1.2	2.0	2.9	1.8	1.9	3.8
12	.....	.....	.....	.....	.....	1.7	3.1	1.7	3.0	1.7	1.7	2.8
13	.....	.....	.....	.....	.....	1.9	2.5	1.6	2.1	1.7	1.7	2.2
14	.....	.....	.....	.....	.....	6.8	1.8	1.5	1.8	1.6	1.6	5.6
15	.....	.....	.....	.....	.....	3.2	1.7	1.4	1.7	1.6	1.5	4.4
16	.....	.....	.....	.....	.....	2.4	1.6	1.4	1.6	1.5	1.6	3.5
17	.....	.....	.....	.....	.....	2.1	2.2	1.5	1.5	1.6	1.6	2.8
18	.....	.....	.....	.....	.....	1.8	2.3	1.5	1.5	1.4	1.5	2.5
19	.....	.....	.....	.....	.....	1.7	3.1	1.4	2.4	1.4	2.5	2.4
20	.....	.....	.....	.....	.....	1.7	1.7	1.4	1.7	1.4	2.1	2.0
21	.....	.....	.....	.....	.....	1.8	2.0	1.3	1.6	1.4	2.1	2.1
22	.....	.....	.....	.....	.....	1.7	1.8	1.4	1.7	1.4	2.0	2.0
23	.....	.....	.....	.....	.....	1.5	3.5	1.3	1.6	1.4	1.9	4.5
24	.....	.....	.....	.....	.....	1.4	2.3	1.9	2.2	1.4	5.3	3.9
25	.....	.....	.....	.....	.....	1.4	4.4	1.8	1.8	1.3	4.2	2.9
26	.....	.....	.....	.....	.....	1.6	5.3	1.6	1.6	1.3	3.1	2.5
27	.....	.....	.....	.....	.....	2.0	3.5	1.5	1.5	1.3	2.7	2.2
28	.....	.....	.....	.....	.....	1.6	2.5	1.4	1.5	1.9	2.3	2.1
29	.....	.....	.....	.....	.....	1.5	2.0	1.4	1.5	2.7	2.1	2.1
30	.....	.....	.....	.....	.....	1.4	2.0	1.3	1.5	2.1	1.9	1.9
31	.....	.....	.....	.....	.....	.....	1.8	1.3	.....	1.8	.....	2.5
1908.												
1	2.2	2.3	2.5	3.5	3.1	1.9	.9	1.0	.7	.....	.....	.....
2	2.1	2.8	6.4	3.9	2.4	1.6	.9	1.0	.7	.....	.....	.....
3	2.0	2.8	3.9	3.0	3.0	1.5	1.7	.9	.7	.....	.....	.....
4	1.9	2.6	2.9	2.5	2.8	1.5	1.2	.9	.....	.....	.....	.....
5	2.7	2.7	2.5	2.2	8.2	1.5	1.1	.8	.....	.....	.....	.....
6	2.3	7.5	4.1	2.3	4.3	1.4	.9	.9	.....	.....	.....	.....
7	2.3	3.2	3.8	2.1	4.4	1.3	.9	.8	.....	.....	.....	.7
8	3.5	2.5	3.0	2.0	3.7	1.1	.9	.7	.....	.....	.....	.7
9	3.0	2.7	5.7	4.1	3.0	1.1	1.3	.7	.....	.....	.....	1.4
10	2.3	2.3	3.8	3.0	4.6	1.2	1.2	.7	.....	.....	.....	1.2
11	2.3	2.3	3.1	4.7	3.0	1.1	1.1	.7	.....	.....	.....	1.1
12	2.9	2.6	2.7	3.4	2.5	1.2	1.0	.7	.....	.....	.....	1.6
13	4.9	3.0	2.4	2.7	2.2	1.1	1.2	.....	.....	.....	.....	1.9
14	3.2	3.4	2.5	2.3	2.0	1.1	1.8	.....	.....	.....	.....	1.5
15	2.5	6.0	2.3	2.2	1.9	1.2	2.7	.....	.....	.....	.....	1.3
16	2.3	4.1	2.4	2.3	2.1	1.2	1.6	.....	.....	.....	.....	1.2
17	2.2	2.9	2.2	2.0	1.8	1.2	1.3	.....	.....	.....	.....	1.2
18	2.1	2.3	2.1	1.9	2.2	1.1	1.5	.7	.....	.....	.....	1.2
19	2.0	2.5	8.0	2.2	2.0	1.0	1.6	1.6	.....	.....	.....	2.1
20	2.0	3.6	3.6	2.0	2.2	1.1	1.5	1.3	.....	.....	.....	1.5
21	2.0	2.6	2.8	1.9	2.7	1.0	1.4	1.2	.....	.....	.....	1.3
22	2.0	2.5	2.4	1.8	2.2	1.0	1.3	1.1	.....	.....	.....	1.2
23	1.8	2.3	2.3	1.8	1.9	1.0	1.1	1.1	.....	.....	.....	1.1
24	2.1	2.0	2.5	1.8	1.6	1.0	1.1	1.0	.....	.....	.....	1.1
25	2.2	2.0	2.3	1.7	1.9	1.4	1.7	1.0	.....	.....	.....	1.1
26	1.8	4.0	2.1	1.8	1.7	1.1	1.7	1.1	.....	.....	.....	1.1
27	5.2	4.0	2.0	1.7	1.7	1.0	1.7	1.0	.....	.....	.....	1.1
28	2.9	2.8	2.0	1.6	1.6	.9	1.4	1.0	.....	.....	.....	1.1
29	2.7	2.5	2.4	1.6	1.6	.9	1.3	.9	.7	.....	.....	1.1
30	2.2	.....	3.6	1.6	4.1	1.0	1.2	.8	.....	.....	.....	1.1
31	2.3	.....	3.7	.....	2.6	.....	1.1	.8	.....	.....	.....	1.1

NOTE.—Water was standing in pools at gage height 0.7 foot and on those days for which no gage height is given.

YOUGHIOGHENY RIVER AT CONFLUENCE, PA.

The Youghiogheny rises in Garrett County, Md., and flows in a northwesterly direction into Pennsylvania, emptying into Monongahela River about 15 miles above Pittsburg. Its source is on the western slope of the Allegheny Mountains, at an elevation of about 2,900 feet. For 19 miles above its mouth the average fall of the stream is about 2 feet per mile, but above that point it soon increases to an average fall of nearly 5 feet per mile. The average width of the river from its mouth to West Newton, Pa., is about 546 feet.

The gaging station which was established by the United States Geological Survey September 15, 1904, to obtain comparative and statistical data regarding the discharge of the Youghiogheny for use in the determination of methods of flood prevention and for storage, navigation, and power problems, is located at a highway bridge about one-half mile from the railroad station at Confluence, Pa. It is now maintained by the Water Supply Commission of Pennsylvania, by which the records of gage heights and discharge measurements are furnished.

No important tributaries enter above the station. Casselman River, having approximately the same drainage area as Youghiogheny River, enters from the right about one-half mile below the station, and a short distance below Casselman River, Laurel Hill Creek enters also from the right. This creek has about one-fourth the drainage area of the Youghiogheny above Confluence. The joining of these three tributaries to the main Youghiogheny River, together with the inadequate flood channel capacity of the main stream, causes gorging and backwater at high stages to a greater or less extent in all of them. No measurements have yet been obtained which show backwater at the Youghiogheny station, but from general conditions it is believed to occur occasionally, particularly at very high stages, although much less than at the Casselman and Laurel Hill stations. A tangent has been adopted for the rating curve at high stages and applied directly without correction throughout 1907 and 1908. It may give excessive discharge occasionally, but in general and from daily comparisons with other stations the results are believed to be essentially correct.[a]

Conditions of flow are probably permanent, although somewhat disturbed by a low rock dam under the bridge. The low-water rating curve is fairly well defined. The discharge is occasionally affected by ice conditions. The datum of the gage has remained constant since the establishment of the station.

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[a] See also Casselman River and Laurel Hill Creek at Confluence, Pa.

Discharge measurements of Youghiogheny River at Confluence, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	A. H. Horton	222	475	3.38	1,390
August 15	H. D. Padgett	201	196	2.20	307
1908.					
February 16	F. F. Henshaw	257	1,900	9.10	8,850
August 21	R. H. Bolster	178	98	1.59	76
September 25[a]	F. E. Langenheim	75	69	1.20	22.9

[a] Wading measurement.

Daily gage height, in feet, of Youghiogheny River at Confluence, Pa., for 1907 and 1908.

[Observer, L. L. Mountain.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	6.3	2.65	3.2	2.45	3.1	3.2	2.2	2.9	2.05	2.05	2.3	3.2
2	4.9	3.2	4.15	2.4	3.0	5.55	2.7	2.7	2.0	1.95	2.35	3.0
3	4.4	6.35	3.6	2.3	2.95	4.5	2.55	2.6	2.65	1.9	6.0	3.1
4	3.9	5.0	3.4	2.25	3.2	3.5	2.35	2.5	2.6	2.1	4.7	3.9
5	3.7	3.75	3.25	2.25	2.9	4.5	2.1	2.5	2.5	2.1	4.3	3.0
6	3.4	3.65	3.1	2.2	2.85	4.8	2.05	3.4	2.2	2.55	4.1	2.5
7	3.4	3.6	3.0	2.25	3.15	4.2	2.0	3.1	2.05	2.45	6.75	2.75
8	3.9	3.3	2.95	2.4	3.15	4.05	1.95	3.0	2.05	2.4	5.25	3.0
9	6.75	3.15	2.9	2.4	8.25	3.6	1.9	2.9	2.05	3.0	5.1	3.2
10	5.0	2.8	3.0	2.75	5.25	3.2	1.9	2.8	2.0	2.7	4.25	5.95
11	4.2	2.7	3.5	2.8	4.4	5.15	2.8	2.75	2.45	2.5	3.8	5.85
12	11.15	2.65	3.5	3.0	4.0	3.85	5.35	2.6	2.5	2.4	3.6	5.6
13	7.25	2.65	16.2	3.0	3.4	4.05	3.85	2.5	2.3	2.45	2.15	5.4
14	11.6	2.6	19.0	3.1	3.05	5.3	3.05	2.4	2.1	2.3	2.95	5.0
15	8.9	2.9	9.5	3.0	2.85	4.05	2.7	2.3	2.0	2.25	2.75	4.6
16	6.7	2.85	6.5	3.7	2.85	3.6	2.5	2.2	1.9	2.4	2.55	4.3
17	6.3	2.8	5.0	3.7	2.75	3.4	5.2	2.1	1.9	2.4	2.5	4.0
18	8.1	2.75	4.4	3.45	2.65	3.1	6.1	2.1	2.05	2.25	2.6	3.85
19	12.65	3.0	14.0	3.3	2.85	2.85	4.6	2.1	2.3	2.15	3.1	2.5
20	9.3	3.85	10.7	3.3	4.4	2.75	3.8	2.0	2.3	2.1	2.8	2.4
21	6.2	3.4	6.7	3.25	3.65	2.7	3.2	1.9	2.2	2.1	2.65	2.35
22	4.8	3.1	5.7	3.2	3.55	2.6	3.2	1.9	2.1	2.0	2.85	2.5
23	4.1	3.05	4.3	3.2	3.45	2.4	4.6	2.2	2.1	1.95	2.8	6.05
24	3.7	3.0	3.75	5.3	3.35	2.6	4.0	4.0	2.4	1.9	2.8	7.25
25	4.0	2.95	3.35	4.4	3.05	2.3	3.8	3.55	2.15	1.85	2.9	5.75
26	3.7	2.9	3.1	3.85	3.15	2.3	6.6	3.1	2.1	1.9	3.0	4.7
27	3.3	2.9	3.0	3.7	3.25	2.3	5.35	2.75	2.0	2.0	3.15	3.85
28	3.05	3.0	2.85	3.55	3.2	2.2	4.2	2.55	1.9	3.3	3.25	5.0
29	2.9	.....	2.8	3.4	3.1	2.2	3.7	2.35	1.85	2.75	3.75	5.2
30	2.8	.....	2.65	3.2	2.9	2.2	3.35	2.2	2.1	2.35	3.15	4.2
31	2.7	.....	2.55	.....	2.9	.....	2.95	2.1	.....	2.4	.....	4.1
1908.[b]												
1	3.8	3.3	2.7	4.75	2.6	2.95	1.6	1.65	1.5	1.3	1.3	1.3
2	3.6	2.95	7.5	4.75	2.5	2.75	1.6	1.6	1.5	1.3	1.3	1.3
3	3.5	2.75	7.2	4.05	2.5	2.6	1.6	1.6	1.5	1.3	1.3	1.3
4	3.0	2.6	5.5	3.65	3.55	2.5	1.6	1.55	1.45	1.3	1.3	1.3
5	2.95	2.55	5.1	3.4	7.85	2.45	1.6	1.55	1.45	1.3	1.3	1.25
6	2.9	2.55	7.4	3.4	6.7	2.4	1.55	1.55	1.45	1.3	1.3	1.25
7	2.65	2.7	10.9	3.2	10.25	2.5	1.55	2.05	1.45	1.3	1.3	1.4
8	2.5	2.6	7.75	3.9	8.1	2.35	1.55	1.9	1.45	1.25	1.3	1.5
9	2.65	2.55	10.05	5.4	6.15	2.2	1.5	1.7	1.45	1.25	1.3	1.4
10	2.55	2.55	6.6	4.55	5.25	2.1	1.5	1.5	1.4	1.25	1.3	1.5
11	2.45	2.6	5.3	7.25	4.45	2.0	1.5	1.5	1.4	1.25	1.3	1.5
12	6.45	2.7	5.0	4.95	3.85	2.0	1.5	1.5	1.4	1.25	1.3	1.6
13	5.8	3.75	5.0	4.2	3.5	1.95	1.5	1.45	1.4	1.25	1.3	1.7
14	5.35	5.65	5.3	3.75	3.35	1.9	1.7	1.45	1.35	1.25	1.3	1.7
15	4.65	15.0	5.0	3.6	3.9	2.05	1.85	1.4	1.35	1.25	1.3	1.7
16	3.65	8.75	4.8	3.5	3.6	2.0	1.85	1.4	1.3	1.25	1.3	1.7
17	3.3	5.8	4.4	3.4	3.4	1.95	1.85	1.4	1.3	1.25	1.3	1.7
18	2.95	4.95	4.5	3.3	3.25	1.9	1.8	2.35	1.25	1.25	1.35	2.2
19	2.8	4.0	11.0	4.3	4.3	1.9	1.95	2.0	1.25	1.25	1.35	2.8
20	2.65	3.5	6.75	4.0	5.3	1.85	1.85	1.75	1.25	1.25	1.4	2.3

[a] No information available regarding ice conditions 1907. It is quite probable that there was some effect from ice during February, 1907.

[b] See note at end of table, next page.

Daily gage height, in feet, of Youghiogheny River at Confluence, Pa., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.[a]												
21	2.7	3.2	4.9	3.35	5.6	1.85	1.7	1.55	1.2	1.25	1.4	2.0
22	3.1	3.15	4.15	3.2	6.6	1.9	1.6	1.5	1.2	1.25	1.4	1.85
23	3.2	2.9	3.8	3.1	4.4	1.9	1.5	1.5	1.2	1.25	1.4	1.85
24	3.05	2.8	3.75	3.0	4.4	1.85	2.45	1.7	1.2	1.25	1.4	1.85
25	3.0	2.7	3.25	2.9	3.9	1.85	2.2	1.7	1.2	1.3	1.4	1.8
26	3.25	2.7	3.0	2.8	3.6	1.8	2.1	1.65	1.2	1.3	1.35	1.7
27	3.95	2.7	2.85	2.6	3.5	1.7	2.0	1.65	1.2	1.3	1.35	1.6
28	3.75	2.7	2.8	2.45	3.3	1.65	1.9	1.65	1.3	1.3	1.35	1.7
29	3.1	2.65	3.65	2.45	3.6	1.65	1.85	1.6	1.3	1.3	1.35	1.7
30	2.85	.....	3.8	2.4	4.2	1.6	1.75	1.55	1.3	1.3	1.3	1.7
31	3.7	.....	4.55	.....	3.3	.....	1.7	1.5	.....	1.3	.....	1.75

[a] No information available regarding ice conditions, 1908; discharge probably not affected at any time during this year.

Rating table for Youghiogheny River at Confluence, Pa., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.20	23	2.30	465	3.40	1,316	4.50	2,467
1.30	33	2.40	533	3.50	1,407	4.60	2,585
1.40	47	2.50	603	3.60	1,501	4.70	2,705
1.50	67	2.60	674	3.70	1,598	4.80	2,827
1.60	93	2.70	746	3.80	1,698	4.90	2,951
1.70	127	2.80	820	3.90	1,801	5.00	3,077
1.80	168	2.90	896	4.00	1,907	5.20	3,337
1.90	217	3.00	974	4.10	2,015	5.40	3,604
2.00	271	3.10	1,055	4.20	2,125	5.60	3,880
2.10	334	3.20	1,139	4.30	2,237	5.80	4,166
2.20	399	3.30	1,226	4.40	2,351	6.00	4,460

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1904 to 1909 and is fairly well defined below gage height 10 feet. Above gage height 6 feet the rating curve is a tangent, the difference being 150 per tenth.

Monthly discharge of Youghiogheny River at Confluence, Pa., for 1907 and 1908.

[Drainage area, 435 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	14,400	746	4,200	9.66	11.14	B.
February	4,980	674	1,240	2.85	2.97	C.
March	24,000	638	4,090	9.40	10.84	B.
April	3,470	399	1,120	2.57	2.87	A.
May	7,840	710	1,460	3.36	3.87	A.
June	3,810	399	1,470	3.38	3.77	A.
July	5,360	217	1,540	3.54	4.08	A.
August	1,910	217	685	1.57	1.81	A.
September	710	192	379	.871	.97	A.
October	1,230	192	467	1.07	1.23	A.
November	5,580	366	1,530	3.52	3.93	A.
December	6,340	499	2,240	5.15	5.94	A.
The year	24,000	192	1,700	3.91	53.42	
1908.						
January	5,140	568	1,440	3.31	3.82	A.
February	18,000	638	2,050	4.71	5.08	B.
March	12,000	746	3,910	8.99	10.36	B.
April	6,340	533	1,730	3.98	4.44	A.
May	10,800	603	2,760	6.34	7.31	B.
June	935	93	333	.766	.85	A.
July	568	67	158	.363	.42	B.
August	499	47	116	.267	.31	B.
September	67	23	40.7	.094	.10	B.
October	33	28	30.3	.070	.08	B.
November	47	33	37.2	.086	.10	B.
December	820	28	150	.345	.40	B.
The year	18,000	23	1,060	2.44	33.27	

NOTE.—Open channel rating applied throughout 1907-8.

CASSELMAN RIVER AT CONFLUENCE, PA.

This station was established by the United States Geological Survey September 15, 1904, at a highway bridge about 500 yards from the railroad station. It is now maintained by the Water Supply Commission of Pennsylvania, by which the records of gage heights and discharge measurements are furnished to obtain data for the determination of methods of flood prevention, and for storage, navigation, and power problems.

No important tributary enters near the station. It is located, however, only a few hundred yards above the junction of Casselman and Youghiogheny rivers, and as a result backwater usually occurs at high stages. The measurements indicate that as a rule backwater does not occur below gage height 4 feet, and below this stage a good rating curve has been developed under permanent channel conditions. Above 4 feet a double reversed rating curve has been used which shows about 1 to 2 feet backwater. From daily comparisons of discharge of the 3 streams at Confluence, this seems to be a fair average of backwater conditions which, of course, vary with each flood.[a]

The discharge is more or less affected by ice during the winter periods. The datum of the gage has remained the same since the installation of the station. The bridge was moved a little by the flood of March 14, 1907, but gage heights were not materially affected thereby nor by the repairs to the bridge later.

Discharge measurements of Casselman River at Confluence, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	A. H. Horton	217	409	3.00	1,140
August 15	H. D. Padgett	194	172	1.88	153
1908.					
February 16	F. F. Henshaw	248	2,170	10.20	8,900
Do	do	248	1,560	7.73	5,560
February 17	do	228	1,010	5.52	3,320
August 21	R. H. Bolster	219	148	1.67	85
September 25 [b]	F. E. Langenheim	69	68	1.35	13.2

[a] See also Youghiogheny River and Laurel Hill Creek at Confluence, Pa.
[b] Wading measurement.

Daily gage height, in feet, of Casselman River at Confluence, Pa., for 1907 and 1908.

[Observer, L. L. Mountain.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.8	2.5	2.5	2.65	3.1	3.1	2.4	2.2	1.8	1.9	1.95	2.9
2	4.3	2.7	3.5	2.6	2.9	5.55	2.85	2.1	1.75	1.85	1.9	2.85
3	3.8	5.3	3.2	2.55	3.0	4.55	2.5	2.0	1.9	1.8	4.95	2.8
4	3.5	3.7	3.0	2.5	3.3	3.65	2.25	2.0	2.2	1.85	4.1	2.75
5	3.3	3.25	2.9	2.45	3.1	4.85	2.3	2.0	2.2	1.9	3.6	2.7
6	3.05	3.1	2.9	2.45	2.95	4.55	2.3	2.45	2.0	2.0	3.3	2.6
7	3.05	2.95	2.9	2.55	3.2	3.65	2.3	2.4	1.85	1.95	6.0	2.35
8	3.5	2.85	2.8	2.5	3.25	3.7	2.25	2.2	1.8	1.9	4.15	2.45
9	6.0	2.75	2.7	2.45	8.55	3.3	2.15	2.2	1.8	2.25	3.65	2.6
10	4.2	2.7	2.6	2.85	5.1	3.05	2.2	2.15	1.8	2.1	3.1	6.2
11	3.5	2.6	2.8	2.9	4.15	6.25	2.55	2.15	3.0	2.05	2.9	6.1
12	11.2	2.55	3.0	3.1	3.8	4.45	4.95	2.1	2.8	2.0	2.75	5.7
13	7.5	2.5	16.3	3.0	3.35	4.75	3.25	2.05	2.4	2.35	2.6	5.55
14	11.25	2.5	18.1	2.95	3.15	6.55	2.7	2.0	2.2	2.0	2.55	5.25
15	8.15	2.75	8.3	2.9	3.0	5.15	2.5	1.9	2.05	2.1	2.45	4.1
16	5.85	2.7	6.1	3.4	2.9	3.75	2.4	1.8	2.0	2.0	2.35	3.95
17	5.4	2.65	4.5	3.3	2.8	3.45	3.35	1.9	2.0	1.95	2.3	3.75
18	6.4	2.6	3.9	3.2	2.7	3.20	3.8	1.9	2.0	1.95	2.4	3.55
19	12.2	2.8	14.2	3.1	2.85	3.05	2.9	1.9	2.15	1.95	2.95	2.35
20	9.0	3.3	10.4	3.1	4.4	2.95	2.5	1.8	2.15	1.9	2.7	2.4
21	5.5	2.95	6.1	3.05	3.65	2.85	2.3	1.75	2.1	1.85	2.55	2.5
22	4.2	2.7	5.1	3.2	3.5	2.75	2.2	1.75	1.9	1.85	2.75	2.7
23	3.5	2.7	4.0	3.2	3.3	3.2	2.15	1.85	1.9	1.8	2.75	5.95
24	3.1	2.7	3.55	4.6	3.2	2.85	2.15	2.8	2.1	1.75	2.7	5.25
25	3.3	2.6	3.3	3.6	3.05	2.75	2.2	2.35	2.0	1.7	2.65	4.3
26	3.1	2.5	3.1	3.25	3.3	2.55	4.1	2.2	1.95	1.75	2.7	3.7
27	2.9	2.5	3.2	3.25	3.3	2.45	3.5	2.1	1.85	1.9	2.95	3.4
28	2.9	2.55	3.2	3.2	3.25	2.3	2.55	2.0	1.8	2.5	3.1	4.6
29	2.8	.....	3.1	3.15	3.15	2.4	2.4	1.9	1.75	2.25	3.35	4.7
30	2.7	.....	2.9	3.1	3.05	2.45	2.3	1.85	1.9	2.1	2.95	3.8
31	2.6	.....	2.75	.....	2.9	.....	2.15	1.8	.....	2.0	.....	3.6
1908.												
1	3.4	2.6	2.65	3.8	2.7	2.85	1.75	1.7	1.5	1.5	1.4	1.4
2	3.0	2.55	6.8	4.3	2.6	2.65	1.75	1.6	1.5	1.5	1.4	1.4
3	2.8	2.5	6.3	3.5	2.55	2.5	1.75	1.6	1.45	1.5	1.4	1.45
4	2.75	2.4	4.65	3.2	2.85	2.4	1.75	1.55	1.45	1.5	1.4	1.45
5	2.7	2.4	4.6	3.05	6.95	2.3	1.75	1.55	1.4	1.5	1.35	1.45
6	2.65	2.35	7.25	3.1	5.7	2.2	1.75	1.55	1.4	1.45	1.35	1.45
7	2.45	2.45	10.6	3.0	10.3	2.15	1.75	1.75	1.4	1.45	1.35	1.5
8	2.25	2.35	7.05	3.9	7.2	2.1	1.75	1.7	1.4	1.45	1.35	1.6
9	2.5	2.35	9.35	4.8	5.2	2.05	1.7	1.7	1.4	1.45	1.35	1.5
10	2.45	2.45	5.7	3.9	4.2	2.0	1.7	1.6	1.35	1.4	1.35	1.55
11	2.4	2.45	4.6	7.55	3.6	1.95	1.65	1.55	1:35	1.4	1.4	1.6
12	7.1	2.55	4.75	4.7	3.25	1.95	1.65	1.55	1.35	1.4	1.4	1.7
13	5.8	3.1	5.00	3.9	3.05	1.95	1.65	1.50	1.35	1.4	1.4	1.65
14	4.8	4.9	5.4	3.5	3.0	1.9	1.75	1.50	1.35	1.4	1.4	1.6
15	4.5	16.1	5.0	3.3	3.7	2.1	1.85	1.45	1.35	1.4	1.4	1.7
16	3.3	7.95	5.0	3.2	3.1	2.05	1.85	1.45	1.35	1.4	1.45	1.75
17	2.95	5.05	4.25	3.0	3.0	2.0	1.8	1.45	1.35	1.4	1.45	1.9
18	2.9	4.8	4.6	3.1	3.0	2.0	1.8	1.65	1.3	1.4	1.5	2.85
19	2.6	3.8	11.3	4.15	3.3	1.95	1.7	2.0	1.3	1.4	1.55	2.55
20	2.45	3.15	6.35	3.3	4.7	1.9	1.7	1.75	1.3	1.4	1.6	2.15
21	2.65	2.95	4.5	3.1	5.3	2.3	1.7	1.6	1.3	1.4	1.6	1.95
22	3.2	2.9	3 75	3.0	5.8	2.25	1.95	1.55	1.3	1.4	1.6	1.9
23	3.25	2.8	3.5	2.95	3.5	2.15	1.85	1.55	1.3	1.4	1.55	1.9
24	2.85	2.7	3.5	2.9	3.55	2.1	2.95	1.6	1.35	1.4	1.55	1.9
25	2.65	2.65	3.15	2.85	3.25	2.3	2.9	1.6	1.35	1.45	1.55	1.9
26	3.0	2.6	2.95	2.8	3.05	2.0	2.65	1.55	1.3	1.45	1.5	1.8
27	3.15	2.6	2.85	2.65	2.9	1.9	2.45	1.55	1.3	1.45	1.45	1.7
28	3.2	2.6	2.8	2.55	2.8	1.8	2.3	1.55	1.3	1.45	1.45	1.75
29	2.7	2.55	3.5	2.55	3.0	1.8	2.1	1.6	1.3	1.45	1.45	1.75
30	2.45	.....	3.25	2.5	4.0	1.75	1.95	1.55	1.5	1.45	1.4	1.7
31	2.5	.....	3.9	.....	3.1	.....	1.8	1.5	.....	1.45	.....	1.95

NOTE.—No information is available regarding ice conditions 1907 and 1908; it is probable, however, that there was little or no effect due to ice

Rating table for Casselman River at Confluence, Pa., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.30	9	2.70	866	4.10	2,315	6.00	3,720
1.40	19	2.80	967	4.20	2,390	6.20	3,910
1.50	36	2.90	1,070	4.30	2,465	6.40	4,110
1.60	61	3.00	1,175	4.40	2,535	6.60	4,310
1.70	95	3.10	1,281	4.50	2,600	6.80	4,510
1.80	141	3.20	1,388	4.60	2,660	7.00	4,720
1.90	196	3.30	1,497	4.70	2,720	7.20	4,950
2.00	260	3.40	1,608	4.80	2,785	7.40	5,180
2.10	331	3.50	1,720	4.90	2,850	7.60	5,410
2.20	408	3.60	1,835	5.00	2,920	7.80	5,640
2.30	491	3.70	1,945	5.20	3,065	8.00	5,880
2.40	579	3.80	2,050	5.40	3,220	9.00	7,200
2.50	671	3.90	2,145	5.60	3,380	10.00	8.600
2.60	767	4.00	2,235	5.80	3,545		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1904 to 1909, and is well defined below gage height 4 feet. There is a double reversal in the rating curve between gage heights 4 and 10 feet on account of backwater effect. See description. Above gage height 10 feet the rating curve is a tangent, the difference being 150 per tenth.

Monthly discharge of Casselman River at Confluence, Pa., for 1907 and 1908.

[Drainage area, 450 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	11,900	767	3,280	7.29	8.40	B.
February	3,140	671	1,020	2.27	2.36	C.
March	20,800	671	3,560	7.91	9.12	B.
April	2,660	625	1,180	2.62	2.92	A.
May	6,580	866	1,630	3.62	4.17	B.
June	4,260	491	1,780	3.96	4.42	B.
July	2,880	370	844	1.88	2.17	A.
August	967	118	311	.691	.80	A.
September	1,180	118	308	.684	.76	A.
October	671	95	254	.564	.65	A.
November	3,720	196	1,200	2.67	2.98	A.
December	3,910	535	1,880	4.18	4.82	B.
The year	20,800	95	1,440	3.19	43.57	
1908.						
January	4,840	450	1,280	2.84	3.27	B.
February	17,800	535	1,800	4.00	4.31	B.
March	10,600	816	3,230	7.18	8.28	B.
April	5,350	671	1,640	3.64	4.06	B.
May	9,050	719	2,130	4.73	5.45	B.
June	1,020	118	356	.791	.88	A.
July	1,120	78	245	.544	.63	A.
August	260	28	64.7	.144	.17	B.
September	36	9	16.3	.036	.04	C.
October	36	19	24.9	.055	.06	C.
November	61	14	28.7	.064	.07	C.
December	1,020	19	160	.356	.41	A.
The year	17,800	9	915	2.03	27.63	

LAUREL HILL CREEK AT CONFLUENCE, PA.

This station was established by the United States Geological Survey September 15, 1904, at a highway bridge about one-quarter mile from the railroad station. It is now maintained by the Water Supply Commission of Pennsylvania, by whom the records of gage heights and discharge measurements are furnished. It was established to obtain data for use in the determination of methods of flood and water pollution prevention and for storage and power problems.

No important tributary enters near the station. It is located, however, only a few hundred yards above its junction with Youghiogheny River, and as a result backwater almost invariably occurs at high stages. The measurements indicate that as a rule backwater does not occur below gage height 3.0 feet. At low stages, however, conditions of flow are changeable owing to the fact that refuse dumped into the creek from a tannery a few feet above the station settles under one end of the bridge. As a result, the records of flow at this station are not so good as those at the other two Confluence stations. For high stages a reversed curve followed by a tangent has been used, the backwater effect increasing with the stage. This curve seems to give fair average results for flood stages and the daily discharges compare favorably with Casselman and Youghiogheny rivers. Backwater conditions vary with each flood.[a]

The discharge is affected by ice during the winter periods. The datum of the gage has remained constant during the period of maintenance of the station.

Discharge measurements of Laurel Hill Creek at Confluence, Pa., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	A. H. Horton	92	175	2.52	260
August 15	H. D. Padgett	85	120	2.07	72
1908.					
February 16	F. F. Henshaw	114	595	6.73	1,940
February 17	do	102	275	3.74	960
August 21	R. H. Bolster	73	81	1.61	16.8

[a] See Casselman River and Youghiogheny River at Confluence, Pa.

Daily gage height, in feet, of Laurel Hill Creek at Confluence, Pa., for 1907 and 1908.

[Observer, L. L. Mountain.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4.8	2.35	2.7	2.4	2.7	3.25	2.2	2.3	2.0	2.05	2.1	2.5
2	3.55	2.55	3.2	2.4	2.6	4.0	2.5	2.2	2.0	1.95	2.05	2.45
3	3.2	3.35	3.0	2.3	2.65	3.25	2.25	2.1	2.3	1.9	4.25	2.3
4	3.2	2.5	2.75	2.25	2.8	2.6	2.15	2.05	2.4	2.05	4.3	2.2
5	3.0	2.3	2.5	2.2	2.5	3.0	2.1	2.0	2.25	2.0	3.5	2.25
6	2.8	2.25	2.35	2.2	2.5	2.5	2.1	2.55	2.2	2.15	3.05	2.15
7	2.8	2.2	2.25	2.25	2.85	2.5	2.05	2.25	2.15	2.05	4.0	2.05
8	3.3	2.25	2.2	2.35	2.9	2.7	2.05	2.4	2.1	2.0	5.1	2.35
9	3.9	2.3	2.3	2.4	5.0	2.55	2.0	2.35	2.1	2.6	3.1	2.5
10	3.2	2.4	2.35	2.6	3.4	2.35	1.95	2.3	2.05	2.35	3.0	4.75
11	3.0	2.35	2.65	2.7	3.1	4.4	2.6	2.25	2.6	2.2	2.8	4.7
12	9.0	2.3	2.7	2.9	2.85	3.8	3.85	2.35	2.55	2.1	2.65	4.5
13	4.0	2.25	14.4	2.7	2.75	3.8	3.0	2.2	2.25	2.2	2.55	4.15
14	8.8	2.35	17.0	2.7	2.65	4.8	2.6	2.1	2.2	2.25	2.5	3.95
15	5.75	2.5	6.7	2.6	2.45	3.85	2.4	2.05	2.15	2.15	2.45	3.7
16	3.95	2.5	5.2	3.0	2.5	3.1	2.35	2.05	2.1	2.1	2.35	2.95
17	3.8	2.45	4.25	3.05	2.5	2.8	4.05	2.0	2.05	2.05	2.3	2.7
18	4.9	2.4	3.85	2.9	2.5	2.65	4.2	1.95	2.1	2.1	2.4	2.5
19	9.6	2.6	12.35	2.9	2.65	2.55	3.4	1.9	2.2	2.05	2.5	2.3
20	6.3	2.95	7.7	2.85	3.15	2.45	2.9	1.9	2.15	2.05	2.45	2.2
21	3.8	2.8	4.25	2.8	2.7	2.35	2.7	1.9	2.05	2.0	2.4	2.25
22	3.3	2.7	3.45	2.75	2.65	2.3	2.5	1.85	2.2	2.0	2.5	2.4
23	2.9	2.6	3.2	2.8	2.6	2.3	2.4	2.15	2.1	2.0	2.45	4.85
24	2.8	2.5	2.95	3.9	2.55	2.3	2.4	3.6	2.1	1.95	2.45	4.75
25	3.0	2.5	2.7	3.4	2.5	2.3	2.3	2.9	2.0	1.9	2.5	3.8
26	2.8	2.5	2.65	3.05	2.7	2.25	3.2	2.7	2.0	1.9	2.5	3.1
27	2.6	2.5	2.65	2.95	3.45	2.2	2.8	2.5	1.9	1.95	2.55	2.95
28	2.5	2.5	2.7	2.9	3.3	2.1	2.45	2.3	1.8	2.85	2.75	3.35
29	2.45	.....	2.6	2.8	3.2	2.15	2.3	2.2	1.75	2.45	2.65	3.45
30	2.4	.....	2.5	2.75	3.0	2.2	2.25	2.1	2.1	2.2	2.55	3.25
31	2.4	.....	2.45	.....	3.0	.....	2.2	2.0	.....	2.25	.....	3.0
1908.												
1	2.85	2.65	2.55	3.25	2.8	2.5	1.85	1.75	1.5	1.6	1.45	1.5
2	2.75	2.55	5.1	3.45	2.7	2.4	1.85	1.7	1.5	1.6	1.45	1.5
3	2.6	2.5	4.35	3.2	2.65	2.3	1.85	1.65	1.45	1.6	1.45	1.5
4	2.55	2.45	3.6	3.0	2.95	2.25	1.8	1.6	1.45	1.6	1.45	1.5
5	2.5	2.4	3.5	2.85	4.1	2.2	1.8	1.6	1.4	1.6	1.45	1.5
6	2.45	2.45	5.1	2.85	3.7	2.2	1.8	1.6	1.4	1.55	1.45	1.5
7	2.45	2.5	8.15	2.75	7.65	2.15	1.8	1.75	1.4	1.55	1.45	1.6
8	2.45	2.35	3.85	4.15	4.75	2.1	1.8	1.7	1.4	1.5	1.45	1.65
9	2.4	2.35	5.5	3.95	4.6	2.1	1.8	1.7	1.4	1.45	1.45	1.55
10	2.4	2.4	3.85	3.35	3.2	2.05	1.75	1.65	1.35	1.4	1.45	1.6
11	2.35	2.35	3.4	5.5	2.6	2.0	1.75	1.6	1.35	1.4	1.5	1.65
12	4.5	2.7	3.6	3.65	2.6	2.0	1.75	1.6	1.35	1.4	1.5	1.75
13	3.45	3.3	3.85	3.2	2.65	1.95	1.75	1.6	1.35	1.4	1.5	1.75
14	3.15	3.8	4.4	2.9	2.55	1.9	1.75	1.55	1.35	1.4	1.5	1.85
15	2.8	12.2	4.35	2.95	2.8	2.15	1.9	1.55	1.35	1.4	1.5	1.85
16	2.65	5.5	4.05	2.9	2.6	2.1	1.85	1.55	1.35	1.4	1.5	1.9
17	2.5	3.7	3.55	2.85	2.65	2.05	1.8	1.55	1.35	1.4	1.5	2.1
18	2.45	3.45	6.15	2.8	2.8	2.0	1.75	2.0	1.3	1.4	1.55	3.1
19	2.4	3.1	9.05	3.5	3.3	1.95	1.75	2.0	1.3	1.4	1.55	2.7
20	2.35	2.9	4.5	3.1	3.6	1.9	1.75	1.9	1.3	1.4	1.6	2.2
21	2.5	2.8	3.5	3.0	3.35	2.1	1.7	1.85	1.3	1.4	1.6	2.05
22	2.95	2.6	3.2	2.9	3.7	2.05	2.4	1.8	1.3	1.4	1.6	2.0
23	2.9	2.6	3.0	2.8	3.0	2.0	2.1	1.8	1.3	1.4	1.55	1.95
24	2.6	2.55	3.0	2.7	2.75	2.4	3.1	1.8	1.3	1.4	1.55	1.95
25	2.55	2.5	2.85	2.6	2.6	2.3	3.05	1.75	1.3	1.45	1.55	1.9
26	2.55	2.45	2.85	2.5	2.55	2.1	2.8	1.7	1.3	1.45	1.55	1.9
27	3.15	2.4	2.75	2.45	2.5	2.0	2.6	1.7	1.3	1.45	1.55	1.9
28	3.0	2.4	2.75	2.4	2.4	1.9	2.4	1.65	1.5	1.45	1.55	2.0
29	2.6	2.35	3.9	2.4	2.4	1.9	2.2	1.6	1.5	1.45	1.55	1.95
30	2.35	.....	3.3	2.45	2.8	1.85	2.0	1.55	1.6	1.45	1.5	1.85
31	2.55	.....	3.6	.....	2.6	.....	1.85	1.5	.....	1.45	.....	1.95

NOTE.—No information available regarding ice conditions 1907 and 1908. It is probable that there was no great effect from ice.

Rating tables for Laurel Hill Creek at Confluence, Pa.

FOR 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.70	10	2.60	295	3.50	840	4.40	1,206
1.80	19	2.70	350	3.60	885	4.50	1,240
1.90	33	2.80	410	3.70	930	4.60	1,274
2.00	53	2.90	475	3.80	975	4.70	1,308
2.10	80	3.00	540	3.90	1,020	4.80	1,342
2.20	115	3.10	610	4.00	1,060	4.90	1,376
2.30	155	3.20	680	4.10	1,100	5.00	1,410
2.40	200	3.30	740	4.20	1,136	5.20	1,476
2.50	245	3.40	790	4.30	1,171	5.40	1,540

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on two discharge measurements made during 1907 and the 1904 to 1906 rating. It is fairly well defined between gage heights 2.0 feet and 3.0 feet. The rating curve is a tangent above gage height 5.4 feet, the difference being 30 per tenth. There is a reversal in the rating curve between gage heights 3.0 and 5.4 feet due to backwater. See description.

FOR 1908.

1.30	4	1.90	52	2.50	284	3.10	636
1.40	7	2.00	76	2.60	338	3.20	690
1.50	11	2.10	106	2.70	395	3.30	742
1.60	16	2.20	142	2.80	456	3.40	790
1.70	23	2.30	185	2.90	522		
1.80	35	2.40	233	3.00	581		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on one discharge measurement made during 1908 and the form of the 1906 and 1907 curves. It is fairly well defined between gage heights 1.6 feet and 3.0 feet. Above gage height 3.4 feet it is the same as the 1907 table.

Monthly discharge of Laurel Hill Creek at Confluence, Pa., for 1907 and 1908.

[Drainage area, 118 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,800	200	919	7.79	8.98	C.
February	765	115	251	2.13	2.22	C.
March	5,020	115	953	8.08	9.32	C.
April	1,020	115	380	3.22	3.59	B.
May	1,410	222	445	3.77	4.35	B.
June	1,340	80	443	3.75	4.18	B.
July	1,140	43	317	2.69	3.10	B.
August	885	26	152	1.29	1.49	B.
September	295	14	99.3	.842	.94	B.
October	442	33	99.3	.842	.97	B.
November	1,440	66	421	3.57	3.98	B.
December	1,360	66	572	4.85	5.59	B.
The year	5,020	14	421	3.57	48.71	
1908.						
January	1,240	209	395	3.35	3.86	B.
February	3,580	209	541	4.58	4.94	B.
March	2,640	311	1,030	8.73	10.06	C.
April	1,570	233	596	5.05	5.63	B.
May	2,220	233	606	5.14	5.93	B.
June	284	44	113	.958	1.07	B.
July	636	23	116	.983	1.13	B.
August	76	14	26.2	.222	.26	B.
September	16	4	6.57	.056	.06	D.
October	16	7	9.55	.081	.09	D.
November	16	9	11.7	.099	.11	D.
December	636	11	75.1	.636	.73	B.
The year	3,580	4	294	2.49	33.87	

MUSKINGUM RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The drainage basin of Muskingum River lies in the eastern part of the State of Ohio. The Muskingum is formed by the junction of Mohican and Tuscarawas rivers at Coshocton, near the central part of Coshocton County. It flows in a slightly southwesterly direction to Zanesville, thence it flows in a southeasterly direction and joins Ohio River at Marietta, Ohio. In the southeastern part of Morgan County the river forms a large bend and flows due north for several miles. Mohican River rises in the northwestern part of Richland County and flows in a general southeastward direction until it joins the main river. Tuscarawas River rises in the western part of Summit County, flows in a general southerly direction to the northeastern part of Tuscarawas County, thence it flows southwestward to its junction with the Mohican. The important tributaries of the Mohican are Walhonding and Killbuck creeks; of the Tuscarawas, Chippewa and Sugar creeks on the west bank, and Sandy and Big Stillwater creeks on the east bank. There are only two tributaries of any importance tributary to the Muskingum, Licking River from the west near Zanesville, and Wills Creek from the east near the southern line of Coshocton County. The length of the river below the junction of the Mohican and Tuscarawas is about 100 miles (map measurement). The total drainage area is about 8,000 square miles.

The drainage basin is regular in shape, being about 100 miles wide and 125 miles long. Only the headwaters of Licking, Mohican, and Tuscarawas rivers lie within the glaciated area, the remainder of the basin being unglaciated. In the central and southern part of the basin the soil has resulted from the disintegration of native rocks, and the country is poorly watered; its surface is extremely rough and irregular, cut in every direction by valleys, between which rise high hills. To the north the surface becomes less broken, though still undulating; the soil has been derived from drift materials and is sandy and gravelly. At the headwaters of Mohican and Tuscarawas rivers it is naturally marshy. This characteristic has been much modified by cultivation and drainage, but swamp areas still exist, and springs are common in the glaciated region. The elevation of the sources of the Mohican and Tuscarawas rivers is about 1,100 feet; the elevation at Coshocton is about 730 feet; at Zanesville about 688 feet; at the mouth of the river at Marietta the elevation is 570 feet.

There are no large forested areas in this drainage basin. This region has been long settled and the timber left standing is in groves or wood lots, generally of small size.

The mean annual rainfall is about 40 inches, being less at the headwaters and greater at the mouth of the river. The winter conditions in the northern part are comparatively severe. Ice forms

on the streams about 1 foot in thickness. In the lower part of the basin the conditions are milder, but ice generally forms on the river.

The basin affords opportunities for storage reservoirs at the headwaters of the tributaries, and reservoirs constructed in 1830 to store water for feeding the Ohio Canal are in existence at the present time. The cost of overflowed land would undoubtedly now prohibit the construction of reservoirs.

The basin offers favorable opportunities for the development of water power, both on the main stream and tributaries.

The Muskingum is navigable from Zanesville down. In this stretch of the river there are 10 locks and dams with a total fall of 118 feet; and the surplus water is available for water power, but only at one or two places is all the power at these dams utilized.

The Ohio Canal, which runs from Cleveland to Portsmouth, Ohio, crosses this drainage basin. At the headwaters of Tuscarawas and Licking rivers are the reservoirs for feeding the canal both ways from the summits, thus some water is diverted from the Muskingum basin. The surplus water from the canal between the two summits is discharged into Muskingum River near Dresden. About the only use made of the canal at the present time is to furnish water for the power plants situated along its banks.

The following gaging stations have been maintained in this drainage basin:

Muskingum River at Zanesville, Ohio, 1905–1908.[a]
Licking River at Pleasant Valley, Ohio, 1902–1906.
Jonathan Creek at Powells, Ohio, 1902–3.

MUSKINGUM RIVER AT ZANESVILLE, OHIO.

This station is located at the Sixth Street Bridge at Zanesville, about 1,000 feet above Lock No. 10. The gage, which belongs to the United States Engineer Corps, is located at the lock. The United States Weather Bureau furnishes the daily gage heights. The gage was established June 4, 1887. On March 11, 1905, discharge measurements were begun at this station to obtain data for the study of water-power, water-supply, pollution, and navigation problems.

Licking River enters from the west about one-half mile above the station. The drainage area above the section is about 5,830 square miles.

The winter conditions are comparatively severe, and ice generally causes some trouble. Several power plants located above the station may modify the flow in low water to some extent.

The datum of the gage has remained unchanged.

The station has not been visited since June, 1906, and nothing is known about the present conditions.

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[a] In House Document No. 278, 1st sess., 54th Cong., 1896, pp. 41–43, Lieut. Col. H. M. Chittenden, U. S. Engineer Corps, gives the discharge of the Muskingum at Zanesville from December 1, 1887, to November 30, 1895.

Daily gage height, in feet, of Muskingum River at Zanesville, Ohio, for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	15.4	10.5	9.3	12.0	12.55	11.5	9.1	10.1	7.8	8.7	8.6	8.0
2	14.85	11.3	10.2	11.2	11.5	12.15	9.0	9.4	7.8	8.5	8.55	8.0
3	14.0	12.2	12.25	10.6	11.0	13.6	9.1	9.1	7.8	8.2	9.4	8.0
4	16.55	12.45	12.45	10.2	10.6	13.65	9.2	8.8	7.8	8.5	10.45	8.0
5	20.55	12.25	11.30	10.3	10.4	13.1	8.7	8.6	8.0	8.5	10.95	8.0
6	21.1	11.75	10.7	10.3	10.5	13.75	8.5	8.5	8.0	8.8	10.35	8.0
7	19.55	11.05	10.2	10.2	10.4	13.55	8.3	8.7	8.0	8.7	9.5	8.0
8	18.0	10.25	9.95	10.2	11.0	12.85	8.3	8.7	7.8	8.4	9.15	8.0
9	17.7	9.85	9.75	10.7	11.5	12.0	8.3	8.5	7.8	8.2	8.9	8.0
10	17.4	9.75	9.7	11.1	11.2	10.9	8.4	8.4	7.7	8.3	8.75	8.0
11	16.1	9.6	9.75	10.6	10.6	10.3	8.6	8.2	7.9	8.4	8.6	8.1
12	16.0	9.45	10.3	10.2	10.2	10.1	9.5	8.2	7.7	8.2	8.55	8.0
13	15.9	9.35	20.7	10.1	9.7	10.4	9.6	8.1	8.0	8.1	8.4	8.0
14	16.15	9.45	30.95	9.9	9.4	11.1	9.8	8.0	8.1	7.9	8.3	8.45
15	16.8	9.7	29.45	9.9	9.2	12.05	9.4	8.0	7.9	7.9	8.25	9.1
16	18.1	10.15	28.2	9.8	9.3	11.6	8.9	8.0	7.8	7.9	8.2	9.35
17	18.7	10.25	27.55	9.8	9.1	10.6	9.6	7.9	7.7	7.8	8.1	9.7
18	20.65	10.3	24.45	9.7	9.2	9.8	11.5	8.0	9.3	7.8	8.1	9.6
19	21.55	10.85	22.0	9.5	9.3	9.4	11.5	7.9	9.7	7.8	8.0	9.2
20	24.2	11.75	23.7	9.3	9.2	9.1	13.5	7.9	9.2	7.8	8.0	8.7
21	24.95	12.35	22.45	9.2	9.1	8.9	13.2	7.9	9.1	7.8	8.15	8.65
22	23.8	11.6	21.0	9.1	9.1	8.9	11.95	7.9	8.7	7.7	8.25	8.5
23	21.5	10.45	19.25	9.3	9.0	8.9	10.7	7.9	8.2	7.7	8.2	10.25
24	17.3	9.85	16.4	10.6	10.1	8.8	10.0	7.9	8.0	7.7	8.2	14.3
25	13.6	9.75	13.55	12.15	11.0	8.6	9.9	8.1	8.2	7.7	8.2	15.15
26	12.2	9.6	12.05	15.8	15.1	8.6	13.4	8.1	7.8	7.7	8.2	14.4
27	11.25	9.45	11.65	19.25	17.55	8.5	17.7	8.6	7.7	7.7	8.2	13.4
28	10.85	9.5	12.95	18.0	17.25	8.6	14.7	8.4	7.6	8.0	8.1	12.1
29	10.65	.....	13.8	16.8	16.15	8.7	13.45	8.0	9.0	8.1	8.15	11.25
30	10.55	.....	13.75	14.45	15.05	8.7	12.55	7.9	8.4	8.3	8.1	10.85
31	10.15	.....	12.9	.....	12.9	.....	11.5	7.8	.....	8.8	.....	11.6
1908.[b]												
1	11.7	9.15	13.1	13.05	9.95	10.75	8.1	8.0	7.7	7.7	7.7	7.7
2	11.15	9.05	22.1	12.95	10.95	10.15	8.2	8.0	7.7	7.6	7.7	7.7
3	10.65	8.8	25.75	12.2	12.15	9.95	8.1	7.9	7.8	7.6	7.7	7.7
4	10.25	8.75	26.0	11.5	12.2	9.6	8.15	7.9	7.8	7.5	7.7	7.7
5	10.4	8.75	24.85	10.8	13.3	9.35	8.0	8.05	7.8	7.6	7.7	7.7
6	10.3	13.75	26.65	10.55	13.3	8.95	8.0	8.7	7.8	7.7	7.7	7.7
7	10.1	11.95	22.4	10.5	18.2	8.7	8.2	8.9	7.8	7.7	7.7	7.75
8	9.75	11.8	20.15	12.4	20.25	8.55	8.2	8.9	7.8	7.7	7.7	7.8
9	9.25	11.6	19.65	17.55	18.4	8.4	8.1	8.6	7.8	7.7	7.7	7.8
10	8.8	11.3	18.5	17.1	17.1	8.4	8.15	8.45	7.8	7.7	7.7	7.8
11	8.8	11.0	17.45	16.75	15.65	8.4	8.2	8.3	7.8	7.7	7.7	7.8
12	9.1	11.3	16.1	15.2	13.85	8.3	8.1	8.2	7.8	7.7	7.7	7.8
13	10.6	14.15	14.75	13.75	11.95	8.3	8.2	8.1	7.7	7.7	7.7	7.8
14	11.35	16.75	13.65	12.3	10.85	8.25	8.25	8.0	7.7	7.7	7.7	7.8
15	10.9	21.55	13.3	11.55	10.4	8.3	8.8	8.0	7.7	7.7	7.7	7.8
16	10.55	24.2	13.25	11.65	10.05	8.4	8.5	8.0	7.6	7.7	7.7	7.8
17	9.85	23.95	12.9	11.85	10.1	8.3	8.5	7.9	7.6	7.7	7.7	7.8
18	9.75	22.2	13.7	11.9	10.75	8.2	8.8	8.05	7.6	7.6	7.7	7.8
19	9.3	20.05	21.2	11.65	11.35	8.1	8.45	8.0	7.6	7.6	7.7	7.8
20	9.2	16.45	22.4	11.95	11.65	8.15	8.6	8.0	7.6	7.7	7.7	7.8
21	9.0	13.35	21.3	11.9	11.35	8.1	8.4	8.0	7.7	7.6	7.7	8.0
22	9.0	11.9	20.8	11.1	11.2	8.8	8.6	7.9	7.7	7.7	7.7	8.0
23	9.0	11.25	19.4	10.5	10.6	9.85	8.8	7.8	7.6	7.7	7.7	8.0
24	9.15	10.7	17.05	10.0	10.3	8.9	8.75	7.8	7.6	7.7	7.7	8.0
25	8.8	10.35	14.4	9.9	9.75	8.35	8.55	7.8	7.6	7.7	7.7	8.0
26	8.75	10.85	12.25	9.9	9.45	8.2	8.25	7.8	7.6	7.7	7.7	8.0
27	9.7	12.3	11.3	9.8	9.25	8.15	8.45	7.8	7.6	7.7	7.7	8.0
28	10.0	12.5	11.0	9.65	9.05	8.1	8.4	7.75	7.7	7.7	7.7	8.0
29	10.5	11.5	12.25	9.45	9.05	8.1	8.4	7.8	7.7	7.7	7.7	8.0
30	9.95	.....	12.8	9.45	9.3	8.15	8.3	7.8	7.6	7.7	7.7	8.0
31	9.65	.....	13.15	.....	11.9	.....	8.15	7.8	.....	7.7	.....	8.0

[a] No information is available regarding ice conditions at this station during 1907. It is believed, however, that there was considerable backwater from this source from the latter part of January to the first part of March.

[b] No information is available regarding ice conditions at this station during 1908. It is believed, however, that there was considerable backwater from this source from the latter part of January to the middle of February.

KANAWHA RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The lower part of this river, below the mouth of the Gauley, is called the Kanawha; above this point it is called the New. The drainage basin of the Kanawha comprises about one-third of the State of West Virginia, part of western Virginia, and the counties of Alleghany, Ashe, and part of Watauga County in the extreme northwestern part of North Carolina. New River is formed by the union of the North Fork and South Fork a few miles south of the northern boundary of North Carolina. Considering the South Fork as the main stream, as it is the larger, the river rises in the central part of Watauga County near Boone, N. C., whence it flows northeastward across the state line into Virginia. At Radford, Va., the river turns abruptly and flows northwestward across West Virginia, and empties into Ohio River at Point Pleasant, W. Va. The total length of the river is 427 miles. The lower 90 miles have been made navigable by means of locks and dams. The total drainage area comprises 12,197 square miles. Beginning at the headwaters and following down the right or eastern bank the important tributaries are Big Reed Island Creek and Little River in Virginia; Greenbrier River, Gauley River, Elk River, and Pocotaligo River in West Virginia; those on the left or western bank are Cripple Creek, Reed Creek, Walker Creek, and Wolf Creek in Virginia; East River, Bluestone River, and Coal River, in West Virginia. The drainage area is irregular in outline. Its length, following the general course of the river, is about 240 miles; its width at the widest point is about 140 miles. The sources of the river lie in the Appalachian Mountains among the high ridges that separate this basin from the basins of Great Pedee and Santee rivers, which drain into the Atlantic Ocean; and from the basin of Tennessee River which drains into the Ohio. The basins of the tributaries in North Carolina and in the southern part of Virginia are more or less regular in outline and circular in shape. The main river crosses the Allegheny Front just below Pearisburg, Va., near the Virginia and West Virginia line. Along this section the basins of the tributaries are long and narrow. Below the state line to the mouth of the river the valley of the Kanawha proper is very narrow.

As all the tributaries except those in the lower part of the basin drain the steep slopes and precipitous sides of mountainous country, the beds of the streams are rough and rocky and there are many falls and rapids. Along the section traversed by the Chesapeake and Ohio Railroad, from the West Virginia line to Charleston, W. Va., and especially from Hinton to the mouth of Gauley River the scenery is exceptionally fine, for through this section the river is confined to a narrow canyon with mountains on both sides. (See Pl. IV.)

The sources of the river are about 3,660 feet above sea level; at its mouth the elevation is 510 feet. The total fall is therefore about 3,100 feet, or an average fall of over 7 feet to the mile. The following table gives some idea of the slope of the river:

Locality.	Elevation.	Distance.	Fall between points.	Distance between points.	Average fall per mile.
	Feet.	*Miles.*	*Feet.*	*Miles.*	*Feet.*
Sources	3,600	0	.....	.....	.....
Junction of North and South Forks	2,500	86	1,100	86	12.8
Radford, Va	1,760	192	740	106	7.0
Virginia-West Virginia State line	1,500	246	260	54	4.8
Hinton, W. Va	1,340	270	160	24	6.7
Gauley River	650	331	690	61	11.3
Upper Pool, Lock No. 2	600	343	50	12	4.2
Mouth	510	427	90	84	1.1

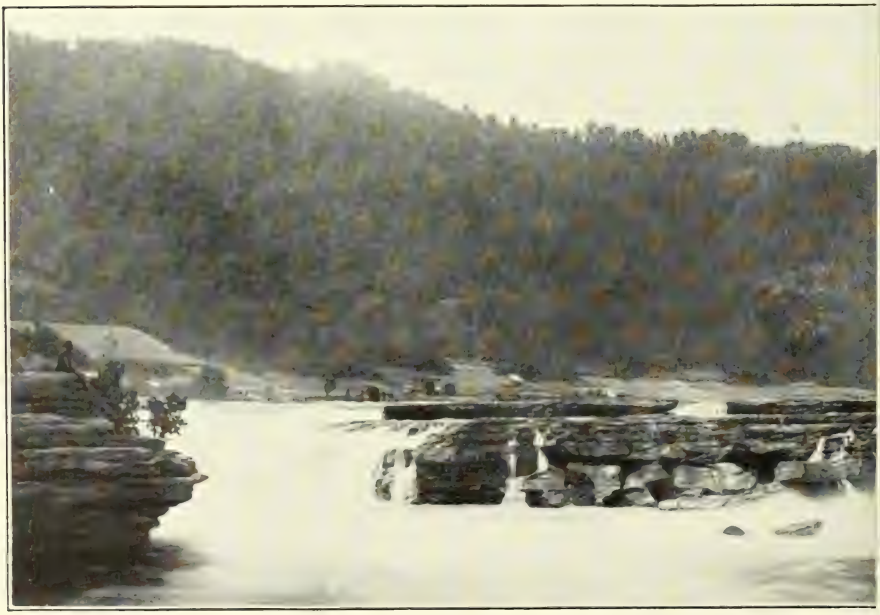
Probably from 10 to 20 per cent of the drainage area is forested. Lumbering is being carried on extensively along many of the tributaries, especially at the headwaters of the Gauley and Greenbrier, where there are large areas of virgin timber. The mean annual rainfall at the sources of the river in North Carolina is about 55 inches; on that part of the drainage basin in Virginia the rainfall is from 45 to 50 inches; in West Virginia the rainfall is 45 inches.

In general, the winters throughout the basin are mild. Ice does not form very thick, and the snowfall is light and does not last long. During the winter of 1908 and 1909 ice formed about 2 inches thick at a few of the stations in the basin and lasted only a few days,

The basin affords many opportunities for storage reservoirs, there being suitable foundation sites for large dams, and material for their construction is readily accessible. Reservoirs would be of use for flood control, as an aid to navigation, and for water-power development. At the present time, the basin affords abundant supplies of coal, oil, and gas, but as these supplies diminish and the cost of fuel increases, the numerous opportunities for power development afforded by the river and its tributaries will be very extensively utilized. The lower part of the river has been made navigable by means of ten locks and dams, the lift ranging from about 6 feet to 14 feet. The lock farthest upstream is located at Montgomery, W. Va., about 84 miles above the mouth; the lowest lock is near Point Pleasant, about one mile above the mouth of the river. The river is used principally for transporting the coal mined from the extensive coal fields along the river above Charleston.

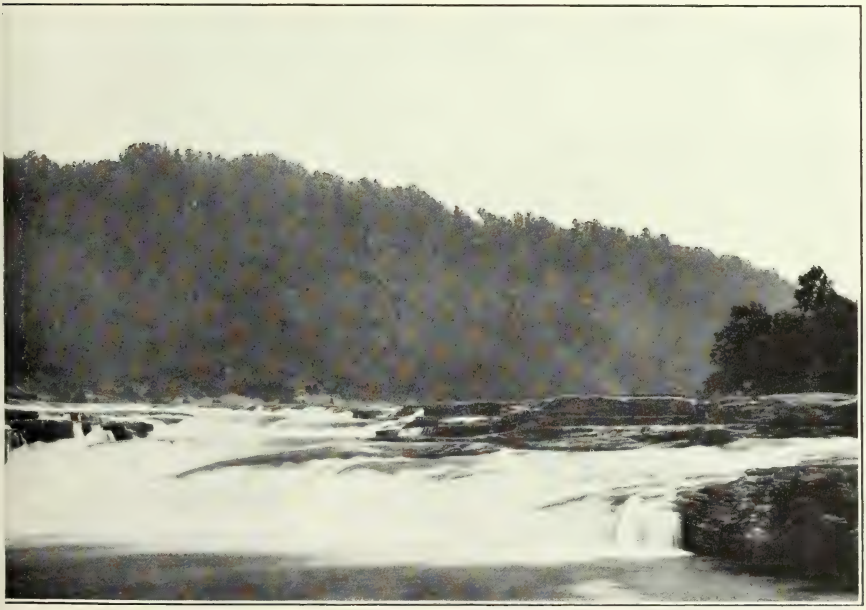
At ordinary stages the tributaries are clear and there is excellent trout and bass fishing in some of the larger streams. The water of the main stream is rarely, if ever, clear, being of a reddish-brown color, said to be due to the red soil of Virginia, and also from the hydraulic mining of iron ore at present carried on in the State.

A. NEW RIVER FALLS, 2 MILES ABOVE SA



B. KANAWHA FALLS, FAYE

TONE, SUMMERS COUNTY, W. VA., IN 1896.



COUNTY, W. VA., IN 1895.

The following gaging stations have been maintained in this drainage basin:

On the main stream:
- North Fork New River at Weaversford, N. C., 1900–1901.
- North Fork New River near Crumpler, N. C., 1908.
- South Fork New River at New River, N. C., 1900–1901.
- South Fork New River near Crumpler, N. C., 1908.
- New River at Oldtown, Va., 1900–1903.
- New River near Grayson, Va., 1908.
- New River at Radford, Va., 1898–1908.
- New River at Hinton, W. Va., 1887–1908 (gage height record by U. S. Weather Bureau).
- New River at Fayette, W. Va., 1895–1904, 1908.

On the tributaries on the right or east bank:
- Big Reed Island Creek near Allisonia, Va., 1908.
- Little River near Copper Valley, Va., 1908.
- Greenbrier River near Marlinton, W. Va., 1908.
- Greenbrier River at Alderson, W. Va., 1895–1908.
- Gauley River at Allingdale, W. Va., 1908.
- Gauley River near Summersville, W. Va., 1908.
- Gauley River at Belva, W. Va., 1908.
- Cherry River at Richwood, W. Va., 1908.
- Meadow River near Russellville, W. Va., 1908.
- Elk River at Webster Springs, W. Va., 1908.
- Elk River at Gassaway, W. Va., 1908.
- Elk River at Clendennin, W. Va., 1908.
- Pocotaligo River at Sissonville, W. Va., 1908.

On the tributaries on the left or west bank:
- Reed Creek at Grahams Forge, Va., 1908.
- Walker Creek at Staffordsville, Va., 1908.
- Wolf Creek near Narrows, Va., 1908.
- Bluestone River at Lilly, W. Va., 1908.
- Coal River at Brushton, W. Va., 1908.
- Coal River at Tornado, W. Va., 1908.

SOUTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

This station, which was established August 12, 1908, to obtain data for use in studying water power, pollution, flood control, and storage problems, is located about 1½ miles above the confluence of the North and South forks of New River, about 4 miles from Crumpler, N. C.

The drainage area above the section is about 325 square miles.

The datum of the gage has remained unchanged; the records are reliable and accurate.

Sufficient data have not been obtained to enable estimates of the flow to be made.

The following discharge measurement was made August 12, 1908:

Width, 177 feet; area, 415 square feet; gage height, 1.48 feet; discharge, 458 second-feet.

Daily gage height, in feet, of South Fork of New River near Crumpler, N. C., for 1908.

[Observer, J. J. Garvey.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.73	1.46	2.27	1.69	16	1.62	1.50	1.53	1.72	1.66
2	.....	1.72	1.40	2.16	1.77	17	1.61	1.48	1.49	1.70	1.64
3	.....	1.68	1.40	2.08	1.64	18	1.62	1.48	1.38	1.76	1.65
4	.....	1.66	1.39	2.02	1.57	19	1.52	1.46	1.38	1.78	1.65
5	.....	1.68	1.38	1.96	1.57	20	1.55	1.44	1.38	1.73	1.63
6	.....	1.82	1.38	1.86	1.57	21	1.56	1.44	1.38	1.68	1.58
7	.....	1.85	1.38	1.78	2.42	22	1.80	1.43	1.48	1.68	1.65
8	.....	1.96	1.36	1.78	2.37	23	1.78	1.43	3.93	1.68	1.85
9	.....	1.76	1.51	1.78	1.97	24	2.00	1.42	6.23	1.66	1.73
10	.....	1.64	2.73	1.75	1.78	25	2.60	1.42	3.08	1.68	1.76
11	.....	1.58	2.18	1.83	1.71	26	3.88	1.40	2.46	1.68	1.95
12	1.48	1.58	1.73	1.78	1.86	27	2.62	1.40	2.23	1.68	1.84
13	1.47	1.53	1.64	1.73	1.81	28	2.23	1.73	2.32	1.64	1.76
14	1.49	1.50	1.56	1.74	1.73	29	2.10	1.68	3.03	1.57	1.83
15	1.51	1.48	1.55	1.75	1.69	30	1.96	1.53	2.93	1.57	1.85
						31	1.82	.....	2.44	.....	2.15

NEW RIVER NEAR GRAYSON, VA.

This station is located at the Norfolk and Western Railroad bridge at Fries Junction, about 1 mile from Grayson, Va. It was established August 7, 1908, to obtain data for use in studying water power, pollution, flood control, and storage problems.

Chestnut Creek is tributary immediately below the section. The drainage area above the station is about 1,160 square miles.

The datum of the gage has remained unchanged; the records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of New River near Grayson, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 6	O'Neill and Chapman	646	1,420	4.70	3,170
August 19	W. M. O'Neill	645	1,380	4.11	1,920

Daily gage height, in feet, of New River near Grayson, Va., for 1908.

[Observer, William J. Matkins.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	4.19	4.02	5.22	4.28	16	4.05	3.94	3.99	4.38	4.52
2	.....	4.15	3.98	4.98	4.27	17	4.25	3.90	3.98	4.35	4.37
3	.....	4.11	3.95	4.76	4.18	18	4.10	3.90	3.89	4.38	4.32
4	.....	4.09	3.88	4.76	4.18	19	4.10	3.90	3.88	4.46	4.46
5	.....	4.08	3.80	4.56	4.22	20	4.05	3.90	3.88	4.46	4.37
6	5.04	4.35	3.80	4.50	4.30	21	3.92	3.89	3.88	4.36	4.29
7	4.16	4.32	3.80	4.40	5.23	22	4.01	3.88	3.96	4.33	4.30
8	4.18	4.60	3.80	4.36	6.18	23	4.32	3.88	5.06	4.32	4.46
9	4.14	4.22	3.94	4.35	5.26	24	4.25	3.87	9.20	4.28	4.41
10	4.16	4.11	5.52	4.34	4.83	25	5.30	3.87	6.38	4.27	4.37
11	4.23	4.02	5.30	4.33	4.66	26	6.85	3.87	5.36	4.24	4.62
12	4.24	4.00	4.48	4.35	4.78	27	5.55	3.87	4.88	4.22	4.72
13	3.99	3.99	4.20	4.34	4.83	28	4.82	4.00	4.80	4.20	4.65
14	4.44	3.98	4.07	4.33	4.66	29	4.62	4.20	5.58	4.21	4.60
15	4.00	3.95	4.00	4.33	4.63	30	4.52	4.12	6.53	4.18	4.79
						31	4.35	.....	5.68	.....	5.24

NEW RIVER AT RADFORD, VA.

This station is located at the toll highway bridge about 1½ miles below the Norfolk and Western Railway bridge. It is near the Norfolk and Western Railway station at Radford, Va. It was established August 1, 1898, discontinued July 15, 1906, and reestablished May 6, 1907. It is maintained to obtain data for use in studying water supply, pollution, water power, flood control, and storage problems.

No important tributaries enter in the immediate vicinity of this station. Little River enters from the right about 6 miles above the station.

The United States Weather Bureau gage was originally used at this point, but owing to its inaccessibility it was replaced by a wire gage referred to the same datum February 23, 1900. On December 1, 1903, the wire gage was replaced by a chain gage and the datum lowered 3.41 feet to avoid negative readings. Numerous errors entered into the gage readings prior to the installation of the chain gage, and estimates of discharge based on them are not very reliable. All estimates at this station were revised in 1905, but it was impossible to eliminate all the gage errors.

Conditions of flow are constant and the discharge is only occasionally affected by backwater from ice conditions. A good low-water rating curve has been developed from recent measurements and two recomputed measurements made in 1900 and 1901. At high stages the rating curve is only approximate. The tubular piers of the bridge interfere somewhat with discharge measurements, and errors have occurred in some measurements due to not considering the area and velocity immediately above them.

Revised data for this station prior to 1906 have been published in Bulletin 3 of the Geological Survey of Virginia.

Discharge measurements of New River at Radford, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 20	R. G. Knight	568	2,290	4.78	5,610
July 22	do	565	1,770	3.88	3,000
1908.					
July 27	O'Neill and Chapman	556	1,980	3.99	3,230
August 20	W. M. O'Neill	549	1,860	3.84	2,610

Daily gage height, in feet, of New River at Radford, Va., for 1907 and 1908.

[Observer, C. L. Gillespie.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.9	4.6	3.8	3.5	4.2	3.7	3.8
2	.....	.....	.....	.....	.....	5.4	4.2	3.9	3.4	4.0	3.8	3.6
3	.....	.....	.....	.....	.....	5.6	4.2	3.8	3.4	3.9	3.8	3.6
4	.....	.....	.....	.....	.....	5.1	4.2	3.7	3.4	3.8	4.0	3.7
5	.....	.....	.....	.....	.....	4.5	4.2	3.7	5.2	3.8	4.0	3.7
6	.....	.....	.....	.....	6.7	4.0	4.1	3.6	4.8	3.7	4.0	3.7
7	.....	.....	.....	.....	6.7	3.6	4.1	3.6	4.0	3.6	3.9	3.7
8	.....	.....	.....	.....	3.8	3.4	4.1	3.6	3.8	3.6	3.8	3.8
9	.....	.....	.....	.....	3.7	4.2	3.8	3.6	3.5	3.6	3.8	3.8
10	.....	.....	.....	.....	3.7	4.0	3.8	3.6	3.4	3.6	3.8	3.9
11	.....	.....	.....	.....	4.1	5.6	3.7	3.6	3.5	3.6	3.8	4.25
12	.....	.....	.....	.....	4.0	7.2	4.0	3.7	4.1	3.6	3.8	4.3
13	.....	.....	.....	.....	3.9	14.6	4.2	3.7	3.9	3.5	4.6	4.2
14	.....	.....	.....	.....	3.9	11.8	4.7	3.6	3.7	3.5	4.0	4.2
15	.....	.....	.....	.....	3.8	6.8	4.7	3.6	3.6	3.5	4.0	4.5
16	.....	.....	.....	.....	3.8	5.5	4.5	3.6	3.5	3.5	3.9	6.7
17	.....	.....	.....	.....	3.8	4.7	4.5	3.5	3.5	3.5	3.7	6.5
18	.....	.....	.....	.....	3.8	4.1	4.6	3.5	3.5	3.5	3.7	5.4
19	.....	.....	.....	.....	3.8	3.9	4.4	4.4	3.5	3.5	3.9	4.9
20	.....	.....	.....	.....	3.9	3.7	4.3	4.0	3.5	3.5	4.0	4.3
21	.....	.....	.....	.....	3.8	3.7	4.1	3.9	3.5	3.5	4.0	4.2
22	.....	.....	.....	.....	3.7	3.6	4.1	3.7	3.5	3.4	4.0	4.1
23	.....	.....	.....	.....	3.8	4.4	3.8	4.1	9.5	3.4	4.9	7.4
24	.....	.....	.....	.....	3.8	5.0	3.7	3.9	11.3	3.4	5.3	7.4
25	.....	.....	.....	.....	3.8	4.8	3.7	3.9	6.4	3.6	5.4	7.0
26	.....	.....	.....	.....	3.8	5.4	3.6	3.8	5.1	3.6	5.4	5.6
27	.....	.....	.....	.....	3.8	4.8	3.6	3.8	4.5	3.6	5.4	4.8
28	.....	.....	.....	.....	3.8	4.6	3.6	3.7	4.2	3.6	5.4	4.7
29	.....	.....	.....	.....	3.8	4.6	3.6	3.5	4.2	3.6	4.6	4.5
30	.....	.....	.....	.....	3.8	4.9	3.6	3.5	4.4	3.6	4.2	4.5
31	.....	.....	.....	.....	3.8	.....	3.6	3.5	.....	3.7	.....	4.5
1908.												
1	5.6	4.2	4.7	4.3	4.7	4.3	4.2	4.3	4.1	3.8	5.7	4.1
2	5.0	4.2	5.6	8.1	4.7	4.15	5.2	4.1	3.9	3.8	5.5	4.5
3	4.8	3.9	5.8	7.4	4.5	4.0	4.6	3.9	3.9	3.7	5.2	4.6
4	4.6	3.8	5.2	6.4	4.5	4.1	4.5	3.8	3.8	3.7	4.9	4.3
5	5.0	3.9	5.8	5.6	4.4	8.0	5.3	3.7	3.8	3.6	4.7	4.3
6	5.0	4.85	6.8	5.0	4.3	6.1	5.2	3.7	4.2	3.5	4.5	4.2
7	5.0	5.4	6.5	5.1	4.3	5.2	5.1	4.7	4.2	3.5	4.2	4.3
8	5.0	5.0	5.9	4.8	6.05	4.9	4.9	4.0	4.9	3.5	5.0	6.8
9	5.7	4.5	5.5	4.8	5.5	4.6	5.2	4.6	4.6	3.4	4.9	5.7
10	5.6	4.4	5.2	4.6	5.0	4.4	4.8	4.2	4.2	4.1	4.3	5.0
11	5.6	4.4	5.0	4.7	4.85	4.25	4.5	4.1	4.0	6.8	4.3	4.7
12	11.8	4.9	5.0	4.5	4.6	4.3	4.3	3.9	3.8	5.0	4.5	4.5
13	9.7	8.8	5.1	4.3	4.5	4.4	4.1	3.8	3.7	4.3	4.3	5.4
14	5.9	9.0	4.9	4.4	4.4	4.25	4.1	3.7	3.4	4.0	4.2	4.9
15	5.9	9.65	4.9	4.4	4.2	5.0	4.1	3.7	3.5	3.7	4.2	4.5
16	5.6	10.7	4.8	4.5	4.2	5.1	4.0	3.6	3.5	3.6	4.5	4.5
17	5.0	9.3	4.9	4.5	4.2	5.0	3.9	3.7	3.5	3.6	4.1	4.3
18	4.9	6.7	4.9	4.5	4.3	4.5	3.9	3.7	3.5	3.6	4.1	4.3
19	4.8	5.7	4.6	4.6	4.4	4.1	3.9	3.7	3.4	3.7	4.6	4.2
20	4.6	5.3	4.7	4.5	4.7	4.2	3.9	3.7	3.4	3.7	4.7	4.3
21	4.6	5.1	4.7	4.4	5.6	4.2	3.8	3.7	3.4	3.7	4.6	4.2
22	4.4	5.0	4.8	4.2	5.3	4.2	3.8	3.7	3.4	3.6	4.4	4.2
23	4.5	4.8	4.7	4.1	5.05	4.05	3.8	5.2	3.5	3.6	4.3	4.5
24	4.5	4.9	5.3	4.2	4.8	4.4	4.5	4.2	3.5	7.7	4.2	4.9
25	4.4	4.1	5.3	4.25	4.7	4.3	4.1	4.0	3.6	8.6	4.2	4.3
26	4.2	4.1	5.1	5.4	4.5	4.2	4.1	8.0	3.6	5.8	4.1	5.2
27	4.4	5.2	4.9	5.6	4.4	4.1	3.9	6.8	3.6	5.0	4.0	5.3
28	4.8	4.9	4.7	5.1	4.2	4.1	4.1	5.2	3.6	4.8	4.0	4.9
29	4.4	4.7	4.7	4.85	4.3	4.0	4.2	4.6	4.1	5.9	4.0	4.7
30	4.3	.....	4.6	4.6	4.5	4.0	4.3	4.5	3.8	8.1	4.0	5.1
31	4.2	.....	4.2	.....	4.5	.....	4.4	4.3	.....	7.7	.....	6.1

NOTE.—The observer evidently made mistakes in recording the foot marks for several days' gage heights during May and June, 1907. These have been corrected by estimation and by comparison with the Greenbrier station.

Rating table for New River at Radford, Va., for 1898 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.40	1,640	4.90	6,380	6.30	12,040	8.40	22,100
3.50	1,900	5.00	6,770	6.40	12,470	8.60	23,250
3.60	2,160	5.10	7,160	6.50	12,900	8.80	24,440
3.70	2,430	5.20	7,550	6.60	13,340	9.00	25,650
3.80	2,710	5.30	7,940	6.70	13,780	9.20	26,870
3.90	3,000	5.40	8,340	6.80	14,230	9.40	28,100
4.00	3,290	5.50	8,740	6.90	14,680	9.60	29,340
4.10	3,590	5.60	9,140	7.00	15,130	9.80	30,580
4.20	3,900	5.70	9,540	7.20	16,030	10.00	31,820
4.30	4,220	5.80	9,950	7.40	16,950	11.00	38,230
4.40	4,550	5.90	10,360	7.60	17,900	12.00	44,840
4.50	4,900	6.00	10,770	7.80	18,890	13.00	51,620
4.60	5,260	6.10	11,190	8.00	19,920	14.00	58,670
4.70	5,630	6.20	11,610	8.20	20,990	15.00	66,010
4.80	6,000						

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 12 discharge measurements made during 1904 to 1908, and is well defined between gage heights 3.0 feet and 7.5 feet. Above gage height 7.5 feet the rating table is based on the extension of the area and velocity curves and is only approximate.

Monthly discharge of New River at Radford, Va., for 1907 and 1908.

[Drainage area, 2,720 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 6-31	13,800	2,430	3,620	1.33	1.29	B.
June	63,000	1,640	8,970	3.30	3.68	B.
July	5,630	2,160	3,530	1.30	1.50	A.
August	4,550	1,900	2,510	.923	1.06	A.
September	40,200	1,640	5,400	1.99	2.22	A.
October	3,900	1,640	2,210	.812	.94	A.
November	8,340	2,430	4,120	1.51	1.68	A.
December	17,000	2,160	5,930	2.18	2.51	A.
1908.						
January	43,500	3,900	8,420	3.10	3.57	A.
February	36,300	2,710	9,860	3.62	3.90	A.
March	14,200	3,900	7,300	2.68	3.09	A.
April	20,400	3,590	6,640	2.44	2.72	A.
May	11,000	3,900	5,500	2.02	2.33	A.
June	19,900	3,290	5,270	1.94	2.16	A.
July	7,940	2,710	4,480	1.65	1.90	A.
August	19,900	2,160	4,460	1.64	1.89	A.
September	6,380	1,640	2,710	.996	1.11	A.
October	23,200	1,640	6,000	2.21	2.55	A.
November	9,540	3,290	4,880	1.79	2.00	A.
December	14,200	3,590	5,860	2.15	2.48	A.
The year	43,500	1,640	5,950	2.19	29.70	

NEW RIVER AT FAYETTE, W. VA.

This station, which is located at the highway bridge connecting Fayette with South Fayette, W. Va., was established July 29, 1895; discontinued May 22, 1901; reestablished August 11, 1902; discontinued December 31, 1904; and reestablished July 16, 1908. Its records furnish data for water power, flood control, and storage problems.

Wolf Creek enters on the right bank about one-eighth mile above the station; the drainage area above the section is about 6,800 square miles.

The bed of the river here is rock, with large bowlders on the bottom, which cause eddies and boils at high stages. The bottom has been carefully determined and by using standard soundings and care in making measurements the discharge can be determined with accuracy.

The datum of the gage has remained constant during the maintenance of the station, but numerous errors have entered into many of the gage readings prior to 1908, particularly before the chain gage was installed November 20, 1903, the original wire gage being frequently many tenths in error. Owing to this cause and to the difficulty of securing accurate measurements at Fayette, all estimates of discharge heretofore published are only fair.

Estimates of the discharge are withheld until sufficient measurements are obtained to develop a complete curve based upon recent measurements.

Discharge measurements of New River at Fayette, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 13	W. G. Hoyt	188	2,730	[a] 3.24	4,530
August 14	do	184	2,660	[b] 2.59	4,030
September 19	W. M. O'Neill	175	2,360	1.32	2,430
September 21	do	177	2,440	[c] 1.50	2,630
Do	do	175	2,400	1.24	2,460

[a] Stage fell 0.5 foot during measurement. [b] Gage height doubtful. [c] Gage height is approximate.

Daily gage height, in feet, of New River at Fayette, W. Va., for 1908.

[Observer, John R. Durrett.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		3.82	3.24	2.22	10.27	2.78	16		2.10	1.56	1.44	2.72	5.86
2		3.72	2.91	1.87	7.60	2.76	17		2.10	1.48	1.38	2.42	5.08
3		3.52	2.58	1.50	6.40	2.78	18		2.08	1.42	1.34	2.55	4.70
4		2.81	2.28	1.22	6.16	2.98	19		2.06	1.35	1.31	3.04	4.36
5		2.28	2.08	1.07	5.48	3.45	20	2.32	2.14	1.26	1.36	2.82	4.61
6		2.16	2.44	.95	4.24	3.32	21	2.42	2.04	1.20	1.38	2.62	4.54
7		2.11	3.12	.93	3.86	3.19	22	2.22	1.90	1.17	1.34	2.50	4.36
8		2.65	3.65	.95	4.22	3.38	23	2.26	1.69	1.06	1.32	3.45	4.44
9		4.44	3.65	.94	4.52	4.48	24	2.64	1.68	1.08	1.37	3.65	4.30
10		4.94	3.72	.96	4.49		25	3.98	3.62	1.06	12.38	3.42	5.09
11		4.58	2.87	1.30	3.48		26	3.88	2.88	1.01	9.09	3.20	8.04
12		3.92	2.35	7.20	2.34		27	3.72	9.76	.96	6.92	3.02	8.10
13		3.43	1.98	4.71	2.10	7.90	28	5.54	7.78	.94	5.35	2.92	7.80
14		2.84	1.80	3.12	2.60	7.48	29	5.78	6.42	1.02	4.66	2.85	7.54
15		2.30	1.63	1.70	3.11	6.82	30	4.88	4.96	1.19	7.22	2.81	8.00
							31	4.08	3.70		11.36		11.02

NORTH FORK OF NEW RIVER NEAR CRUMPLER, N. C.

This station is located at a ford about 1 mile above the confluence of the North and South forks of New River, about 2½ miles north of Crumpler, N. C. It was established August 13, 1908, to obtain data

for use in studying water power, pollution, flood control, and storage problems.

The drainage area above the section is about 279 square miles.

The datum of the gage has remained unchanged. The records are accurate and reliable. Sufficient data have not been obtained to enable estimates of the discharge to be made.

The following discharge measurement was made August 10, 1908:

Width, 202 feet; area, 294 square feet; gage height, 2.24 feet; discharge, 415 second-feet.

Daily gage height, in feet, of North Fork of New River near Crumpler, N. C., for 1908.

[Observer, J. J. Garvey.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.10	1.70	3.22	2.90	16	2.02	1.82	1.78	2.22	2.64
2	.....	2.05	1.71	2.98	2.92	17	2.10	1.82	1.76	2.25	2.58
3	.....	2.00	1.62	2.75	2.62	18	2.05	1.78	1.71	2.35	2.56
4	.....	1.98	1.61	2.65	2.51	19	1.95	1.78	1.68	2.55	2.71
5	.....	2.02	1.60	2.47	2.55	20	1.95	1.74	1.65	2.50	2.62
6	.....	2.25	1.62	2.38	2.45	21	1.92	1.72	1.65	2.46	2.54
7	.....	2.70	1.60	2.36	5.30	22	2.10	1.72	1.72	2.40	2.65
8	.....	2.20	1.60	2.31	4.35	23	2.10	1.71	3.88	2.30	2.51
9	.....	1.92	1.86	2.22	3.30	24	2.09	1.68	6.25	2.30	2.50
10	.....	1.90	3.12	2.14	3.05	25	3.50	1.66	3.59	2.24	2.52
11	.....	1.90	2.10	2.25	2.90	26	3.68	1.68	2.88	2.19	3.28
12	1.93	1.87	1.95	2.43	3.45	27	2.80	1.65	2.60	2.14	2.85
13	1.89	1.86	1.80	2.22	3.10	28	2.58	1.98	2.80	2.08	2.84
14	1.87	1.82	1.80	2.29	2.90	29	2.35	2.05	4.35	2.10	3.13
15	1.83	1.80	1.78	2.30	2.70	30	2.23	1.82	4.25	2.12	3.47
						31	2.15	.....	3.75	.....	4.18

REED CREEK AT GRAHAMS FORGE, VA.

This station, which is located at the highway bridge at Grahams Forge, Va., was established July 29, 1908, to obtain data for solving water power, flood control, and storage problems.

The drainage area above the station is about 247 square miles.

There is a dam and grist mill just above the station. The storage is small and the miller states that water flows over the dam at all times, so that the flow is modified little, if any, by the dam. The datum of the gage has remained unchanged, and the records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the discharge to be made.

Discharge measurements of Reed Creek at Grahams Forge, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 30	O'Neill and Chapman	125	255	2.46	243
Aug. 15	W. M. O'Neill	124	221	2.29	158

Daily gage height, in feet, of Reed Creek at Grahams Forge, Va., for 1908.

[Observer, Robert Runion.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.38	2.33	2.24	2.97	2.58	16	.....	2.25	2.24	2.28	2.49	2.77
2	.....	2.31	2.32	2.20	2.90	2.88	17	.....	2.37	2.24	2.27	2.51	2.69
3	.....	2.27	2.26	2.18	2.76	2.78	18	.....	2.32	2.22	2.22	2.67	2.67
4	.....	2.26	2.22	2.19	2.70	2.70	19	.....	2.27	2.22	2.26	3.19	2.67
5	.....	2.24	2.32	2.14	2.62	2.64	20	.....	2.25	2.24	2.20	3.08	2.65
6	.....	2.24	2.38	2.18	2.56	2.60	21	.....	2.24	2.20	2.28	2.82	2.60
7	.....	2.23	2.40	2.17	2.53	3.18	22	.....	2.26	2.19	2.28	2.74	2.65
8	.....	2.24	3.18	2.18	2.50	3.58	23	.....	2.22	2.20	2.21	2.64	2.65
9	.....	2.48	2.48	2.22	2.48	3.14	24	.....	2.26	2.20	3.17	2.61	2.65
10	.....	2.50	2.42	2.46	2.48	2.88	25	.....	2.42	2.15	2.72	2.58	2.72
11	.....	2.47	2.36	2.82	2.52	2.78	26	.....	2.68	2.20	2.52	2.54	3.91
12	.....	2.38	2.30	2.50	2.51	2.96	27	.....	2.54	2.20	2.48	2.48	3.27
13	.....	2.30	2.29	2.41	2.48	3.24	28	.....	2.48	2.20	2.58	2.48	3.17
14	.....	2.24	2.28	2.33	2.50	3.02	29	.....	2.41	2.31	3.92	2.48	3.39
15	.....	2.25	2.23	2.32	2.51	2.86	30	2.48	2.39	2.25	4.58	2.48	3.72
							31	2.42	2.32	.....	3.48	.....	4.09

BIG REED ISLAND CREEK NEAR ALLISONIA, VA.

This station, which is located at J. P. Thomas's farm about 1½ miles from Allisonia, Va., was established July 31, 1908, to obtain data for use in studying water power, flood control, and storage problems.

The drainage area above the section is about 291 square miles. Little Reed Island Creek is tributary on the left bank a short distance below the station.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Big Reed Island Creek near Allisonia, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 1	O'Neill and Chapman	205	344	0.72	384
August 18	W. M. O'Neill	200	313	.63	323

Daily gage height, in feet, of Big Reed Island Creek near Allisonia, Va., for 1908.

[Observer, J. P. Thomas.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.6	0.6	0.75	0.7	16	0.6	0.6	0.6	0.8	0.7
2	0.64	.6	.6	.8	.7	17	.65	.6	.6	.8	.7
3	.62	.6	.6	.8	.7	18	.5	.5	.6	.8	.75
4	.6	.6	.55	.8	.7	19	.6	.5	.6	1.15	.8
5	.64	.65	.5	.8	.7	20	.6	.5	.6	.85	.8
6	1.75	1.05	.5	.8	.7	21	.6	.5	.6	.8	.8
7	1.2	.8	.5	.8	1.3	22	.65	.5	.6	.8	.8
8	.9	1.3	.5	.75	1.2	23	.75	.5	.6	.8	.85
9	.9	.75	.5	.7	.95	24	.7	.5	.6	.8	.9
10	.82	.7	1.9	.7	.8	25	1.0	.5	1.15	.8	1.05
11	.74	.6	1.35	.75	.8	26	1.7	.5	.8	.8	1.15
12	.7	.6	.85	.8	.9	27	1.3	.5	.8	.75	.9
13	.68	.6	.75	.8	.8	28	.8	.85	.95	.7	.8
14	.65	.6	.7	.8	.8	29	.8	.9	1.95	.7	.8
15	.65	.6	.65	.8	.8	30	.7	.65	1.5	.7	.8
						31	.7	.....	1.0	.....	.85

LITTLE RIVER NEAR COPPER VALLEY, VA.

This station, which is located at the highway bridge about 5 miles south of Childress, and 1 mile north of Copper Valley, Va., was established July 28, 1908, to obtain data for use in studying water-supply, water-power, flood-control, and storage problems.

Indian Creek is tributary about 600 feet below the station. The drainage area above the section is about 195 square miles.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Little River near Copper Valley, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 28	O'Neill and Chapman	155	331	3.74	337
August 21	W. M. O'Neill	150	271	3.39	182

Daily gage height, in feet, of Little River near Copper Valley, Va., for 1908.

[Observers, William J. Trail and Thomas A. DeHart.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.45	3.44	3.43	4.06	3.71	16	.....	.....	3.39	3.57	3.86	3.71
2	.....	.....	3.41	3.40	3.96	3.72	17	.....	3.42	3.36	3.52	3.86	3.68
3	.....	3.35	3.39	3.37	3.88	3.61	18	.....	3.34	3.38	3.53	3.95	3.68
4	.....	3.34	3.39	3.36	3.85	3.59	19	.....	3.36	3.36	3.52	4.38	3.72
5	.....	3.34	3.44	3.36	3.79	3.71	20	.....	3.32	3.38	3.53	4.07	3.70
6	.....	4.04	4.36	3.34	3.72	3.67	21	.....	3.32	3.38	3.50	3.93	3.66
7	.....	3.98	4.29	3.33	3.71	4.62	22	.....	3.32	3.39	3.50	3.83	3.71
8	.....	3.44	4.42	3.33	3.71	4.23	23	.....	3.40	3.39	3.86	3.81	3.81
9	.....	.....	3.66	3.37	3.71	3.95	24	.....	3.42	3.36	6.50	3.77	3.80
10	.....	4.05	3.51	5.77	3.71	3.81	25	.....	3.69	3.34	4.51	3.75	3.87
11	.....	3.32	3.48	4.73	3.73	3.78	26	.....	5.14	3.34	4.12	3.72	4.26
12	.....	3.40	3.48	3.96	3.81	3.90	27	.....	3.85	3.33	3.96	3.71	3.98
13	.....	3.38	3.42	3.76	3.71	3.84	28	.....	3.62	3.84	4.13	3.66	3.94
14	.....	3.35	3.42	3.67	3.73	3.75	29	4.56	3.66	3.86	5.29	3.67	3.97
15	.....	3.34	3.40	3.62	3.82	3.71	30	4.66	3.46	3.48	4.90	3.71	4.22
							31	4.02	3.49	.....	4.26	.....	4.88

WALKER CREEK AT STAFFORDSVILLE, VA.

This station, which is located at the highway bridge at Staffordsville, Va., was established July 24, 1908, to obtain data for use in studying water-power, flood-control, and storage problems.

Whitley Creek is tributary a short distance above the station. The drainage area above the section is about 277 square miles. A dam and power plant about 250 feet above the station may modify the flow in extreme low water.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Walker Creek at Staffordsville, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 24	O'Neill and Chapman	77	105	3.24	113
August 22	W. M. O'Neill	89	97	3.02	59

Daily gage height, in feet, of Walker Creek at Staffordsville, Va., for 1908.

[Observer, James D. Worley.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.15	3.2	3.0	4.55	3.55	16	.....	3.15	3.2	3.25	3.4	4.25
2	.....	3.05	3.1	3.0	4.25	3.78	17	.....	3.15	3.15	3.2	3.45	4.2
3	.....	3.05	3.1	3.0	3.95	3.88	18	.....	3.2	3.1	3.15	3.6	4.05
4	.....	3.0	3.1	3.0	3.85	3.75	19	.....	3.2	3.1	2.15	4.55	3.92
5	.....	3.1	3.15	3.0	3.7	3.75	20	.....	3.05	3.05	3.15	4.5	4.35
6	.....	3.1	3.75	3.0	3.6	3.75	21	.....	3.0	3.0	3.15	4.2	3.75
7	.....	3.05	3.7	3.0	3.45	4.2	22	.....	3.01	3.0	3.1	3.9	3.8
8	.....	3.05	3.5	3.0	3.45	5.55	23	.....	3.15	3.0	3.1	3.85	3.85
9	.....	3.4	3.4	3.05	3.4	4.75	24	3.22	3.05	3.0	3.9	3.75	3.75
10	.....	3.45	3.3	3.95	3.35	4.48	25	3.31	3.15	3.0	4.1	3.7	3.85
11	.....	3.3	3.3	4.2	3.35	4.25	26	3.4	3.6	3.05	3.7	3.7	6.3
12	.....	3.15	3.3	3.7	3.35	5.3	27	3.25	3.65	3.05	3.55	3.55	5.25
13	.....	3.1	3.2	3.5	3.4	5.4	28	3.35	3.45	3.25	3.6	3.48	4.95
14	.....	3.0	3.25	3.3	3.45	4.85	29	3.3	3.3	3.15	5.25	3.45	5.25
15	.....	3.15	3.2	3.3	3.45	4.48	30	3.25	3.25	3.0	6.5	3.48	5.55
							31	3.2	3.15	.....	5.2	.....	7.0

WOLF CREEK NEAR NARROWS, VA.

This station is located at a highway bridge about 3 miles above Narrows, Va. It was established July 22, 1908, to obtain data for use in studying water-supply, water-power, flood-control, and storage problems.

The drainage area above the station is about 223 square miles.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Wolf Creek near Narrows, Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 22	O'Neill and Chapman	77	123	2.72	92
August 24	W. M. O'Neill	76	110	2.66	64

Daily gage height, in feet, of Wolf Creek near Narrows, Va., for 1908.

[Observer, John A. Hale.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.64	2.64	2.58	3.84	3.09	16	.....	2.56	2.66	2.63	2.99	3.76
2	.....	2.62	2.64	2.57	3.54	3.60	17	.....	2.54	2.64	2.60	3.02	3.62
3	.....	2.58	2.59	2.56	3.38	3.47	18	.....	2.55	2.62	2.59	3.15	3.52
4	.....	2.56	2.54	2.51	3.28	3 38	19	.....	2.62	2.59	2.58	3.70	3.59
5	.....	2.56	2.63	2.50	3.18	3.32	20	.....	2.60	2.59	2.56	3.62	3.50
6	.....	2.62	4.35	2.47	3.09	3.32	21	.....	2.58	2.58	2.57	3.50	3.41
7	.....	2.62	3.45	2.48	3.04	3.87	22	2.72	2.60	2.56	2.56	3.38	3.42
8	.....	2.60	3.19	2.49	2.99	4.72	23	2.72	2.63	2.57	2.58	3.32	3.46
9	.....	2.89	3.04	2.52	2.94	4.18	24	2.72	2.62	2.56	3.02	3.23	3.37
10	.....	2.98	2.92	2.72	2.91	3.88	25	2.72	2.64	2.54	3.24	3.14	3.50
11	.....	2.82	2.85	3.28	2.94	3.65	26	2.68	2.99	2.52	96.2	3.06	5.37
12	.....	2.72	2.82	2.95	3.01	5.12	27	2.64	3.12	2.51	2.84	3.00	4.53
13	.....	2.66	2.81	2.82	3.02	4.84	28	2.74	2.90	2.55	2.82	2.94	4.35
14	.....	2.59	2.72	2.72	3.00	4.30	29	2.82	2.77	2.54	3.84	2.98	4.79
15	.....	2.57	2.74	2.66	3.04	4.01	30	2.74	2.71	2.58	5.09	3.00	5.01
							31	2.71	2.73	.....	4.32	.....	6.52

BLUESTONE RIVER AT LILLY, W. VA.

This station, which is located about 2,000 feet below the mouth of Little Bluestone River at Lilly, W. Va., was established August 22, 1908, to obtain data for use in studying water-power, flood-control, and storage problems.

The drainage area above the station is about 454 square miles.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

The following discharge measurement was made by wading, August 22, 1908:

Width, 97 feet; area, 115 square feet; gage height, 1.10 feet; discharge, 53 second-feet.

Daily gage height, in feet, of Bluestone River at Lilly, W. Va., for 1908.

[Observer, E. M. Lilly.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.12	0.76	2.83	1.54	16	.....	0.90	1.25	1.26	2.22
2	.....	1.05	.79	1.99	1.72	17	.....	.84	.98	1.32	2.12
3	.....	1.00	.76	1.59	1.70	18	.....	.84	.95	1.76	2.10
4	.....	.96	.76	1.35	1.70	19	.....	.82	.95	1.90	2.16
5	.....	.93	.80	1.28	1.60	20	.....	.82	.92	1.90	2.22
6	.....	1.09	.78	2.22	1.47	21	.....	.81	.94	1.89	2.12
7	.....	1.58	.74	1.18	2.15	22	.....	.80	.91	1.74	2.16
8	.....	1.38	.74	1.18	4.00	23	1.10	.80	.88	1.66	2.09
9	.....	1.34	.76	1.20	3.35	24	1.13	.78	.97	1.50	2.25
10	.....	1.11	1.01	1.16	2.18	25	1.23	.76	.98	1.42	2.45
11	.....	1.55	1.45	1.16	3.70	26	1.38	.76	1.16	1.38	5.0
12	.....	1.00	1.47	1.17	4.35	27	1.35	.76	1.18	1.34	3.95
13	.....	.78	1.30	1.26	4.02	28	1.42	.72	1.06	1.30	2.52
14	.....	.92	1.20	1.38	2.50	29	1.28	.79	1.64	1.24	3.81
15	.....	.90	1.26	1.32	2.48	30	1.22	.80	2.83	1.59	4.09
						31	1.13	.....	2.62	.....	5.95

GREENBRIER RIVER NEAR MARLINTON, W. VA.

This station, which is located at the Chesapeake and Ohio Railway bridge on the switch that runs to Campbell's lumber mill near Marlinton, W. Va., was established July 9, 1908, to obtain data for use in studying water supply, pollution, water power, flood control, and storage problems.

Stoney Creek enters immediately above the station. The drainage area above the section is about 408 square miles.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Greenbrier River near Marlinton, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 9	O'Neill and Chapman	217	404	4.01	435
August 3	W. G. Hoyt	181	276	3.59	143

Daily gage height, in feet, of Greenbrier River near Marlinton, W. Va., for 1908.

[Observer, Paris G. Johnston.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	3.79	3.49	3.24	3.38	3.23	16	3.56	3.45	3.20	3.20	3.24	3.57
2	.....	3.66	3.44	3.24	3.36	3.23	17	3.50	3.46	3.26	3.20	3.24	3.73
3	.....	3.58	3.38	3.21	3.36	3.22	18	3.46	3.42	3.24	3.19	3.23	3.85
4	.....	3.53	3.32	3.21	3.35	3.21	19	3.56	3.36	3.22	3.19	3.22	3.88
5	.....	3.72	3.29	3.20	3.34	3.21	20	3.56	3.36	3.20	3.17	3.22	3.87
6	.....	3.84	3.28	3.19	3.33	3.20	21	3.51	3.38	3.20	3.17	3.21	3.86
7	.....	3.76	3.26	3.18	3.32	3.27	22	3.51	3.42	3.19	3.16	3.20	3.85
8	.....	3.65	3.24	3.17	3.31	3.36	23	3.50	3.36	3.18	3.15	3.26	3.85
9	3.99	3.58	3.38	3.23	3.30	3.35	24	4.06	3.54	3.18	3.23	3.30	3.83
10	3.88	3.53	3.34	3.25	3.30	3.33	25	4.48	3.56	3.16	3.25	3.30	3.82
11	3.78	3.46	3.30	3.24	3.28	3.39	26	4.58	3.50	3.15	3.23	3.28	3.80
12	3.68	3.40	3.26	3.23	3.28	3.47	27	4.71	3.46	3.34	3.23	3.28	3.78
13	3.62	3.33	3.24	3.22	3.26	3.47	28	4.72	3.40	3.32	3.21	3.25	3.78
14	3.58	3.42	3.23	3.21	3.26	3.45	29	4.34	3.36	3.29	3.29	3.25	3.76
15	3.60	3.46	3.22	3.21	3.25	3.50	30	4.12	3.55	3.26	3.39	3.24	3.80
							31	3.92	3.54	.....	3.38	.....	3.86

GREENBRIER RIVER AT ALDERSON, W. VA.

This station is located at the highway bridge at Alderson, W. Va. It was established August 1, 1895, was discontinued July 15, 1906, and was reestablished May 10, 1907. It is maintained to obtain data for for use in studying water power, water supply, pollution, flood control, and storage problems.

Muddy Creek, the only important tributary in the immediate vicinity of this station, enters from the right about one-half mile below the bridge.

The records are little affected by ice. The datum of the gage has remained the same since the installation of the station. Conditions of flow are nearly permanent and a good rating curve has been developed.

Discharge measurements of Greenbrier River at Alderson, W. Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 10	R. J. Taylor	411	1,490	4.74	6,440
June 25	R. G. Knight	410	947	3.46	2,760
July 17	do	381	573	2.65	1,260
1908.					
April 21	Follansbee and Barrows	414	1,180	3.94	3,880
August 4	W. G. Hoyt	310	401	2.15	425
August 8	do	310	412	2.20	456
August 10	do	368	662	2.88	1,460
August 18	W. M. O'Neill	297	308	1.70	175

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for 1907 and 1908.

[Observer, W. J. Hancock.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						5.2	2.6	2.5	2.2	2.4	2.1	2.9
2						5.5	2.5	2.3	2.1	2.3	2.28	2.8
3						5.0	2.45	2.2	2.1	2.2	5.0	2.75
4						4.1	2.4	2.1	2.2	2.15	4.28	2.65
5						3.7	2.5	2.05	2.2	2.1	3.5	2.5
6						3.5	2.4	2.05	2.15	2.2	3.2	2.4
7						3.45	2.3	2.0	2.15	2.5	3.0	2.4
8						3.25	2.25	2.45	2.1	2.5	3.1	2.3
9						7.4	2.3	2.3	2.1	5.4	3.1	2.5
10					4.74	5.0	2.25	2.2	2.0	4.0	4.05	3.5
11					4.15	4.75	3.4	2.1	2.3	3.3	5.9	7.75
12					3.8	5.3	3.0	2.3	3.1	3.0	4.7	5.6
13					3.5	6.5	2.85	2.3	3.4	2.7	3.9	4.3
14					3.25	14.35	3.1	2.2	2.85	2.6	3.45	3.85
15					3.1	7.42	2.85	2.05	2.6	2.45	3.1	4.0
16					3.0	5.25	2.7	2.0	2.4	2.4	2.9	3.9
17					2.9	4.6	2.65	1.9	2.3	2.3	2.8	3.6
18					2.8	3.7	4.85	1.95	2.6	2.2	2.7	3.3
19					2.7	3.35	4.8	1.9	2.5	2.2	3.25	3.2
20					2.6	3.1	3.6	1.9	2.5	2.1	4.0	3.0
21					2.6	3.0	3.2	1.85	2.4	2.1	3.75	2.9
22					2.5	2.8	2.8	1.75	2.3	2.1	3.5	2.8
23					2.45	2.8	2.65	1.9	2.35	2.0	3.6	3.25
24					2.4	4.0	2.5	2.0	3.4	2.0	5.25	8.9
25					2.4	3.5	2.5	4.3	3.7	2.0	5.7	6.3
26					2.4	3.5	2.35	3.8	3.0	2.0	4.6	4.75
27					2.5	3.3	2.25	3.2	2.7	2.0	4.0	4.1
28					2.5	3.0	2.2	2.8	2.5	1.95	3.5	3.7
29					2.5	2.8	2.2	2.6	2.4	2.0	3.3	3.7
30					2.45	2.7	2.3	2.4	2.35	2.0	3.1	5.15
31					2.55		2.7	2.3		2.05		6.25
1908.												
1	5.3	2.8	2.9	10.65	3.3	3.6	2.1	2.5	2.15	1.7	2.3	1.9
2	4.5	2.8	4.55	7.75	3.6	3.2	2.0	2.35	2.1	1.7	2.15	1.85
3	4.4	3.0	6.55	6.15	3.45	2.9	2.2	2.25	2.0	1.7	2.0	1.8
4	3.6	3.5	6.0	5.0	3.5	2.9	2.95	2.15	1.95	1.7	1.95	1.8
5	3.5	2.8	5.62	4.3	3.4	4.4	4.08	2.1	1.9	1.65	1.85	1.8
6	3.4	2.6	7.6	3.85	3.4	4.0	3.5	2.1	1.9	1.7	1.8	1.75
7	3.25	2.65	10.4	3.6	8.85	3.4	3.6	1.9	1.9	1.7	1.8	1.9
8	3.0	2.7	9.6	3.4	9.4	3.1	3.3	2.1	1.85	1.7	1.8	2.3
9	3.1	2.7	6.75	3.3	5.75	2.9	2.85	2.6	1.85	1.7	1.8	2.35
10	2.9	2.7	6.2	3.6	4.9	2.8	2.6	2.9	1.8	1.7	1.7	2.2
11	2.85	2.6	5.0	4.4	6.2	2.7	2.45	2.9	1.8	1.75	1.8	2.2
12	9.5	2.9	4.4	5.4	4.8	2.6	2.3	2.6	1.75	1.7	1.75	3.1
13	9.4	4.0	4.2	4.6	4.1	2.5	2.2	2.4	1.75	1.7	1.75	3.4
14	6.4	7.2	4.2	4.1	3.7	2.4	2.15	2.25	1.75	1.7	1.75	3.0
15	4.8	13.0	4.2	3.7	3.4	2.5	2.1	2.2	1.75	1.7	1.8	2.7
16	4.2	14.0	4.2	4.0	3.2	2.5	2.1	2.1	1.7	1.7	1.7	2.5
17	3.9	6.3	4.4	4.8	3.0	2.5	2.1	2.1	1.7	1.7	1.7	2.4
18	3.5	5.0	5.6	4.4	3.0	2.4	2.0	2.05	1.7	1.7	1.7	2.4
19	3.4	4.2	5.65	4.3	3.2	2.3	2.0	2.0	1.7	1.6	1.85	2.6
20	3.2	4.0	6.45	4.4	3.9	2.2	2.0	1.95	1.7	1.7	2.0	2.9

Daily gage height, in feet, of Greenbrier River at Alderson, W. Va., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	3.1	3.5	5.25	4.0	4.55	2.3	1.8	1.9	1.65	1.65	2.1	2.8
22	3.2	3.3	4.5	3.75	4.3	2.4	2.1	1.9	1.7	1.65	2.15	2.6
23	3.5	3.2	4.1	3.4	5.5	2.2	2.1	1.9	1.7	1.65	2.1	2.5
24	3.7	3.1	4.15	3.2	4.3	2.2	2.25	1.85	1.65	1.7	2.1	2.4
25	3.3	3.0	4.0	3.15	4.1	2.6	2.3	1.9	1.65	1.7	2.0	2.4
26	2.9	3.0	3.7	4.0	4.6	2.4	2.75	2.8	1.65	1.8	2.0	3.0
27	3.6	3.0	3.5	4.5	3.9	2.3	3.75	3.2	1.6	1.85	1.95	2.9
28	4.0	2.9	3.2	3.9	3.5	2.3	4.15	2.9	1.6	1.9	1.9	2.8
29	3.8	2.85	3.35	3.5	3.4	2.2	3.75	2.6	1.6	1.9	1.9	2.8
30	3.6	.....	3.6	3.25	4.0	2.1	3.0	2.4	1.6	2.35	1.9	3.1
31	3.4	.....	7.1	.....	4.5	.....	2.7	2.25	.....	2.4	.....	4.4

Rating table for Greenbrier River at Alderson, W. Va., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	103	3.10	1,952	4.60	5,570	7.20	13,860
1.70	143	3.20	2,152	4.70	5,845	7.40	14,600
1.80	195	3.30	2,360	4.80	6,120	7.60	15,350
1.90	258	3.40	2,576	4.90	6,400	7.80	16,120
2.00	330	3.50	2,800	5.00	6,680	8.00	16,910
2.10	414	3.60	3,030	5.20	7,243	9.00	21,030
2.20	511	3.70	3,265	5.40	7,818	10.00	25,560
2.30	623	3.80	3,505	5.60	8,412	11.00	30,420
2.40	748	3.90	3,750	5.80	9,031	12.00	35,620
2.50	888	4.00	4,000	6.00	9,675	13.00	41,060
2.60	1,044	4.10	4,250	6.20	10,340	14.00	46,700
2.70	1,214	4.20	4,505	6.40	11,025	15.00	52,500
2.80	1,390	4.30	4,765	6.60	11,725		
2.90	1,572	4.40	5,030	6.80	12,425		
3.00	1,760	4.50	5,300	7.00	13,140		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903 to 1908, and is well defined below gage height 8.0 feet.

Monthly discharge of Greenbrier River at Alderson, W. Va., for 1907 and 1908.

[Drainage area, 1,340 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 10–31	5,960	748	1,690	1.26	1.03	A.
June	48,700	1,210	6,280	4.69	5.23	A.
July	6,260	511	1,450	1.08	1.24	A.
August	4,760	169	793	.592	.68	A.
September	3,260	330	983	.734	.82	A.
October	7,820	294	989	.738	.85	A.
November	9,350	414	3,440	2.57	2.87	A.
December	20,600	623	4,280	3.19	3.68	A.
1908.						
January	23,200	1,570	4,660	3.48	4.01	A.
February	46,700	1,040	5,730	4.28	4.62	A.
March	27,500	1,570	7,780	5.81	6.70	A.
April	28,700	2,050	5,470	4.08	4.55	A.
May	22,800	1,760	5,290	3.95	4.55	A.
June	5,030	414	1,320	.985	1.10	A.
July	4,380	195	1,290	.963	1.11	A.
August	2,150	226	700	.522	.60	A.
September	462	103	190	.142	.16	A.
October	748	103	189	.141	.16	A.
November	623	143	272	.203	.23	A.
December	5,030	169	1,100	.821	.95	A.
The year	46,700	103	2,830	2.11	28.74	

GAULEY RIVER AT ALLINGDALE, W. VA.

This station, which is located at the Baltimore and Ohio Railroad bridge about one-fourth mile south of the depot at Allingdale, W. Va., was established July 3, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

Rock Creek enters immediately above the station. The drainage area above the section is about 248 square miles.

The section at this station is located at a bridge on a curve. The bottom of the stream is rough, but with care accurate measurements can be obtained. Sufficient data have not been obtained to enable estimates of the flow to be made.

The datum of the gage has remained unchanged. The records are reliable and accurate.

Discharge measurements of Gauley River at Allingdale, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 4	O'Neill and Chapman	168	763	6.20	698
July 31	W. G. Hoyt	150	663	5.62	478
Do.[a]	do			5.62	458
September 26[b]	W. M. O'Neill	34	23	4.07	6

[a] Measured at wooden bridge. [b] Wading measurement.

Daily gage height, in feet, of Gauley River at Allingdale, W. Va., for 1908.

[Observers, H. N. Wood and J. L. Cogar.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.42	4.70	4.10	5.05	4.71	16	5.24	4.91	4.11	4.31	4.40	5.50
2	.....	5.16	4.61	4.31	4.88	4.85	17	5.19	4.85	4.10	4.32	4.40	5.08
3	4.98	5.11	4.56	4.20	4.76	4.80	18	5.14	4.80	4.07	4.38	4.48	5.89
4	5.85	4.94	4.47	4.16	4.62	4.65	19	5.10	4.85	4.02	4.44	4.56	6.95
5	6.97	5.03	4.49	4.10	4.59	4.50	20	5.20	4.74	4.00	4.42	4.55	5.96
6	6.59	5.60	4.51	4.14	4.54	4.52	21	5.05	4.63	3.99	4.47	4.80	5.60
7	6.34	5.81	4.49	4.08	4.44	4.85	22	5.62	4.69	4.04	4.48	4.90	5.45
8	5.70	5.43	4.43	4.07	4.42	5.69	23	5.50	4.78	4.00	4.51	4.80	5.34
9	5.39	5.81	4.41	4.10	4.40	5.15	24	6.72	4.81	3.98	4.54	4.75	5.16
10	5.16	5.99	4.40	4.20	4.40	4.98	25	5.95	4.82	3.97	4.70	4.70	5.22
11	5.89	5.58	4.38	4.21	4.44	5.72	26	6.11	5.42	4.00	4.93	4.65	5.65
12	4.86	5.36	4.29	4.20	4.45	5.75	27	7.56	5.56	4.02	4.95	4.56	5.56
13	4.91	5.26	4.26	4.20	4.44	5.98	28	8.01	5.20	4.04	4.89	4.65	5.25
14	4.96	5.11	4.20	4.26	4.43	5.33	29	6.58	5.07	4.08	4.79	4.64	5.30
15	5.24	5.10	4.14	4.30	4.42	5.25	30	5.94	4.83	4.10	4.89	4.65	5.30
							31	5.58	4.75	.....	5.10	.....	6.40

GAULEY RIVER NEAR SUMMERSVILLE, W. VA.

This station is located at the highway bridge, known as Brock's bridge, about 2½ miles southeast of Summersville, W. Va. It was established July 6, 1908, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Muddlety Creek enters about one-eighth mile above the station. The drainage area above the section is about 686 square miles.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Gauley River near Summersville, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 6	O'Neill and Chapman	202	962	6.99	1,640
July 30	W. G. Hoyt	202	1,110	7.30	2,060

Daily gage height, in feet, of Gauley River near Summersville, W. Va., for 1908.

[Observer, William R. Dooley.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	5.88	4.34	3.52	4.94	4.06	16	5.56	4.72	3.51	3.59	3.76	5.44
2	.....	5.46	4.16	3.56	4.82	4.09	17	5.01	4.70	3.46	3.56	3.65	5.57
3	.....	5.18	4.55	3.57	4.65	4.04	18	4.92	4.58	3.40	3.55	3.79	6.41
4	.....	5.50	3.98	3.54	4.45	4.02	19	5.82	4.48	3.35	3.52	3.90	8.66
5	.....	4.76	3.92	3.48	4.24	4.02	20	5.75	4.42	3.32	3.46	4.18	7.58
6	6.99	5.26	3.92	3.42	4.48	4.09	21	5.28	4.34	3.29	3.42	4.35	6.50
7	8.44	6.42	3.88	3.34	4.20	4.45	22	6.48	4.25	3.24	3.39	4.28	6.17
8	6.99	5.59	3.86	3.30	3.93	5.46	23	6.55	4.34	3.20	3.34	4.19	5.90
9	5.96	6.45	3.82	3.28	3.84	5.65	24	7.48	4.62	3.18	3.29	4.14	5.72
10	5.67	7.29	3.80	3.29	3.78	5.48	25	6.79	4.48	3.18	3.29	4.34	5.89
11	5.40	6.32	3.78	3.40	3.72	5.78	26	7.88	4.92	3.21	3.42	4.16	6.52
12	5.05	5.75	3.72	3.88	3.66	7.41	27	9.60	5.82	3.25	3.88	4.14	6.12
13	4.91	5.39	3.66	3.82	3.88	7.38	28	10.30	5.18	3.28	3.98	4.11	5.79
14	4.80	5.04	3.58	3.76	3.82	6.38	29	8.72	4.81	3.34	3.92	4.05	5.80
15	5.76	4.84	3.56	3.68	3.76	5.76	30	7.34	4.66	3.30	4.42	4.01	6.19
							31	6.34	4.56	.....	5.25	.....	8.12

GAULEY RIVER AT BELVA, W. VA.

This station is located about one-half mile below Belva, W. Va. It was established August 25, 1908, to obtain data for use in studying water power, water supply, pollution, flood control, and storage problems.

Twentymile Creek enters on the right bank about one-eighth mile above the station. The drainage area above the section is about 1,420 square miles.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Gauley River at Belva, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 26	W. G. Hoyt	220	868	2.05	340
September 22 [a]	W. M. O'Neill	48	48	.94	50

[a] Wading measurement.

Daily gage height, in feet, of Gauley River at Belva, W. Va., for 1908.

[Observer, L. L. Davis.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.27	0.74	2.47	1.71	16	.....	1.24	1.34	1.62	3.06
2	.....	1.97	.76	2.32	1.70	17	.....	1.19	1.31	1.62	2.84
3	.....	1.85	.75	2.12	1.72	18	.....	1.14	1.26	1.57	2.78
4	.....	1.77	.76	1.92	1.78	19	.....	1.09	1.18	1.55	5.02
5	.....	1.71	.78	1.86	1.80	20	.....	1.04	1.10	1.54	4.78
6	.....	1.65	1.00	1.74	1.78	21	.....	.99	1.05	1.51	4.00
7	.....	1.62	1.06	1.69	1.80	22	.....	.94	1.02	1.75	3.62
8	.....	1.58	.98	1.56	1.95	23	.....	.90	.98	2.04	3.50
9	.....	1.56	.90	1.49	3.02	24	.....	.84	.92	2.02	3.38
10	.....	1.54	.96	1.46	2.85	25	.....	.82	.90	2.00	3.38
11	.....	1.46	1.00	1.40	2.70	26	.....	.80	.84	1.94	4.22
12	.....	1.46	.95	1.38	2.85	27	1.99	.78	.82	1.89	4.25
13	.....	1.39	.90	1.40	5.28	28	2.90	.76	.81	1.84	3.80
14	.....	1.34	.90	1.42	4.12	29	2.54	.74	1.49	1.78	3.60
15	.....	1.29	.93	1.52	3.45	30	2.28	.72	1.46	1.74	3.50
						31	2.17	.....	1.44	.....	4.48

NOTE.—Gage heights September 13–22 have been interpolated by comparison of other Gauley River stations.

CHERRY RIVER AT RICHWOOD, W. VA.

This station is located at the highway bridge in the town of Richwood, W. Va. It was established July 3, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

The datum of the gage has not been changed; the records are reliable and accurate. Sufficient data have not yet been obtained to enable estimates of the flow to be made.

Discharge measurements of Cherry River at Richwood, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 2	O'Neill and Chapman	108	176	2.54	54
July 28	W. G. Hoyt	119	367	4.24	970
September 26 [a]	W. M. O'Neill	40	25	2.25	8

[a] Wading measurement.

Daily gage height, in feet, of Cherry River at Richwood, W. Va., for 1908.

[Observer, Dennis S. Connelly.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.80	2.50	2.30	2.80	2.48	16	2.65	2.60	2.20	2.26	2.35	2.84
2	.....	.....	2.50	2.26	2.73	2.42	17	2.62	2.50	2.20	2.24	2.35	3.10
3	2.50	2.70	2.40	2.21	2.66	2.40	18	2.81	2.55	2.20	2.24	2.39	3.98
4	2.55	2.65	2.40	2.20	2.50	2.44	19	2.98	2.50	2.20	2.23	2.54	3.88
5	3.00	2.70	2.45	2.20	2.46	2.42	20	2.82	2.50	2.20	2.22	2.66	.....
6	3.54	2.90	2.45	2.20	.....	2.41	21	2.76	2.45	2.15	2.22	2.66	.....
7	3.28	2.80	2.40	2.20	2.41	2.46	22	3.30	2.45	2.25	2.22	2.55	.....
8	3.10	2.70	2.35	2.12	2.40	3.25	23	3.40	2.45	2.30	2.24	2.54	.....
9	3.02	3.45	2.30	2.12	2.38	.....	24	3.70	2.40	2.30	2.58	2.51	2.90
10	2.90	3.05	2.30	2.17	2.37	.....	25	3.52	2.65	2.20	2.60	2.48	2.90
11	2.80	2.65	2.30	2.70	2.87	.....	26	3.22	3.20	2.22	2.53	2.46	3.00
12	2.70	.....	2.30	2.45	4.00	.....	27	4.85	2.80	2.21	2.36	2.45	3.00
13	2.72	.....	2.30	2.36	3.41	.....	28	4.28	2.70	2.22	2.36	2.45	3.00
14	2.55	2.70	2.30	2.30	2.34	.....	29	3.60	2.60	2.32	2.72	2.43	2.80
15	2.55	2.60	2.25	2.29	2.30	2.88	30	3.25	2.55	2.32	3.02	2.48	3.00
							31	3.05	2.50	.....	2.84	.....	3.60

MEADOW RIVER NEAR RUSSELLVILLE, W. VA.

This station is located at Bays Ferry, about 3 miles below Russellville, W. Va. It was established July 17, 1908, to obtain data for use in studying water power, flood control, and storage problems.

Youngs Creek enters about one-fourth mile above the section. The drainage area above the section is about 297 square miles.

This is a cable and boat station. Low-water measurements are made by wading.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not been obtained to enable estimates of the flow to be made.

Discharge measurements of Meadow River near Russellville, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 18	O'Neill and Chapman	106	393	4.07	154
August 7 [a]	W. G. Hoyt	95	114	3.75	68

[a] Wading measurement.

Daily gage height, in feet, of Meadow River near Russellville, W. Va., for 1908.

[Observer, Jacob R. Bays.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		4.28	3.38	2.81	3.94	3.38	16		3.70	2.98	3.27	3.19	4.84
2		4.05	3.32	2.83	3.73	3.48	17		3.67	2.95	3.16	3.19	4.52
3		3.89	3.24	2.83	3.52	3.39	18		3.62	2.93	3.15	3.25	4.69
4		3.77	3.18	2.84	3.38	3.38	19	4.08	3.52	2.92	3.13	3.24	5.59
5		3.68	3.16	2.84	3.30	3.36	20	4.06	3.46	2.89	3.10	3.35	5.57
6		3.74	3.16	2.85	3.24	3.35	21	4.00	3.39	2.87	3.09	3.95	5.19
7		3.70	3.15	2.85	3.19	3.58	22	3.98	3.36	2.87	3.07	4.00	4.95
8		3.64	3.14	2.85	3.16	4.21	23	4.25	3.36	2.85	3.04	3.85	4.83
9		4.16	3.12	2.85	3.15	4.50	24	4.04	3.35	2.85	3.04	3.73	4.67
10		5.31	3.10	2.87	3.13	4.46	25	3.97	3.36	2.85	3.02	3.61	4.61
11		4.78	3.07	2.93	3.12	4.32	26	4.00	3.50	2.84	3.02	3.52	5.23
12		4.39	3.04	2.94	3.13	5.94	27	5.08	4.44	2.83	3.02	3.47	5.20
13		4.07	3.03	2.97	3.16	6.30	28	6.04	4.09	2.83	3.01	3.44	5.13
14		3.88	3.02	3.04	3.21	5.62	29	5.58	3.82	2.82	3.28	3.42	5.13
15		3.76	3.01	3.24	3.21	5.22	30	4.96	3.62	2.82	3.38	3.38	5.29
							31	4.60	3.49		4.08		6.88

ELK RIVER AT WEBSTER SPRINGS, W. VA.

This station is located at the suspension bridge on the grounds of the Webster Springs Hotel at Webster Springs, W. Va. It was established July 1, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

The gage datum has remained unchanged. The records are reliable and accurate. Sufficient data have not yet been collected to enable estimates of the flow to be made.

The following discharge measurement was made July 27, 1908:

Width, 116 feet; area, 795 square feet; gage height, 3.90 feet; discharge, 1,230 second-feet.

Daily gage height, in feet, of Elk River at Webster Springs, W. Va., for 1908.

[Observer, Cherry Woodzell.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.94	2.45	1.76	1.61	1.78	1.53	16	2.18	1.89	1.44	1.40	1.50	2.10
2	2.56	2.30	1.74	1.54	1.69	1.60	17	2.02	1.84	1.39	1.40	1.48	2.10
3	2.06	2.16	1.68	1.50	1.60	1.70	18	1.98	1.81	1.38	1.40	1.45	2.85
4	3.82	2.06	1.64	1.45	1.68	1.70	19	2.06	1.80	1.36	1.40	1.45	3.20
5	3.27	2.00	1.65	1.42	1.55	1.65	20	1.94	1.75	1.35	1.40	1.45	2.85
6	3.25	2.45	1.62	1.40	1.54	1.60	21	1.94	1.70	1.72	1.39	1.7	2.60
7	3.00	2.58	1.60	1.39	1.50	1.70	22	3.28	1.71	1.70	1.38	1.65	2.40
8	2.75	2.28	1.59	1.36	1.45	2.34	23	2.84	1.88	1.60	1.38	1.6	2.38
9	2.52	2.41	1.60	1.35	1.40	2.20	24	4.95	1.87	1.50	1.38	1.6	2.30
10	2.34	2.80	1.60	1.35	1.40	2.00	25	3.65	1.79	1.50	1.38	1.6	2.35
11	2.18	2.48	1.50	1.40	1.45	2.00	26	3.55	2.10	1.41	1.59	1.58	2.45
12	2.08	2.34	1.48	1.45	1.46	2.95	27	3.90	2.50	1.40	1.68	1.58	2.40
13	2.18	2.20	1.40	1.42	1.45	2.85	28	4.15	2.30	1.41	1.60	1.58	2.39
14	2.12	2.02	1.40	1.41	1.45	2.50	29	3.35	2.05	1.42	1.65	1.55	2.34
15	2.37	1.99	1.45	1.41	1.50	2.25	30	2.88	1.90	1.42	1.58	1.53	2.39
							31	2.65	1.80	.....	1.78	.....	2.30

ELK RIVER AT GASSAWAY, W. VA.

This station is located at the Coal and Coke Railroad bridge in the northeastern part of Gassaway, W. Va. It was established July 1, 1908, to obtain data for use in studying water supply, water power, flood control, and storage problems.

Little Otter Creek is tributary immediately above the station.

The datum of the gage has not been changed. The records are reliable and accurate. Estimates of the flow are withheld until estimates can be made at the other stations on Elk River.

Discharge measurements of Elk River at Gassaway, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 29	O'Neill and Chapman	152	330	1.98	176
July 24	W. G. Hoyt	151	602	[a] 3.62	1,130
Do	do	167	766	[b] 4.55	2,070
Do	do	169	831	5.11	2,100
Do	do	168	778	4.88	1,760
July 25	do	175	1,160	7.00	3,450
Do	do	175	1,140	6.73	3,240
July 27	do	173	1,160	7.05	3,430
Sept. 23	W. M. O'Neill	143	336	1.92	112
Sept. 24 [c]	do	52	46	1.74	73
Do. [c]	do	74	62	1.74	74
Sept. 25	do	143	285	1.65	53
Sept. 28 [c]	do	45	56	1.51	30
Do	do	143	279	1.51	31

[a] River rose 1.3 feet during the measurement.
[b] River rose 0.5 foot during the measurement.
[c] Wading measurement.

Daily gage height, in feet, of Elk River at Gassaway, W. Va., for 1908.

[Observer, Henry A. Hays.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1								2.56	1.74	1.36	1.30	1.50
2								2.32	1.64	1.34	1.28	1.47
3								2.19	1.58	1.34	1.28	1.44
4								2.09	1.56	1.33	1.26	1.43
5							2.14	2.04	1.54	1.32	1.24	1.42
6							2.42	2.08	1.51	1.39	1.29	1.55
7							2.88	2.30	1.47	1.36	1.50	1.69
8							2.94	2.46	1.44	1.34	1.45	1.73
9							2.81	2.23	1.43	1.33	1.42	1.79
10							2.39	2.46	1.52	1.34	1.41	2.13
11							2.05	2.81	1.50	1.36	1.38	2.17
12							2.04	2.28	1.48	1.35	1.37	2.24
13							2.04	2.22	1.48	1.31	1.36	3.27
14							2.12	2.12	1.48	1.30	1.40	2.84
15							2.34	2.02	1.50	1.29	1.43	2.37
16							2.24	1.90	1.45	1.29	1.46	2.21
17							2.12	1.80	1.44	1.30	1.50	2.17
18							2.28	1.84	1.39	1.31	1.48	2.07
19							2.19	1.82	1.38	1.35	1.47	2.71
20							2.10	1.78	1.34	1.32	1.46	2.85
21							2.02	1.74	1.31	1.37	1.47	2.99
22							2.04	1.70	1.25	1.36	1.48	3.14
23							2.84	1.69	1.55	1.34	1.50	3.21
24							4.42	1.70	1.77	1.33	1.66	3.19
25							6.86	1.70	1.67	1.34	1.66	3.14
26							4.64	1.72	1.55	1.35	1.64	3.08
27							6.96	1.70	1.50	1.34	1.63	2.69
28							6.10	2.12	1.48	1.35	1.59	2.26
29						1.98	4.84	2.05	1.47	1.32	1.57	2.85
30						1.99	3.66	1.99	1.42	1.31	1.55	2.43
31							3.00	1.89		1.30		2.64

ELK RIVER AT CLENDENIN, W. VA.

This station, which is located at the highway bridge in the town of Clendenin, W. Va., was established June 27, 1908, to obtain data for use in studying water power, water supply, flood control, and storage problems.

Big Sandy River is tributary immediately below the section.

The datum of the gage has not been changed. The records are reliable and accurate, except that high water on the Big Sandy alone may produce backwater at the gage. This will not occur often, however, as the Big Sandy is a small stream. The gage reader has been instructed to note any backwater effect. Sufficient data have not yet been collected to enable estimates of discharge to be made.

Discharge measurements of Elk River at Clendennin, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 27	O'Neill and Chapman	139	500	3.00	577
July 23	W. G. Hoyt	161	513	2.94	437
September 23 [a]	W. M. O'Neill	40	28	1.86	27
September 29 [a]	do	50	52	2.11	69

[a] Wading measurement.

Daily gage height, in feet, of Elk River at Clendenin, W. Va., for 1908.

[Observers, Perry E. Young and E. C. Riley.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							2.60	3.60	2.49	2.06	1.76	2.10
2							2.53	3.28	2.40	2.01	1.78	2.05
3							2.49	3.06	2.32	1.94	1.80	2.02
4							2.44	2.89	2.25	1.89	1.80	2.00
5							2.90	2.78	2.24	1.84	.....	2.02
6							4.11	2.76	2.22	1.81	.....	2.00
7							4.02	2.76	2.14	1.79	1.80	2.06
8							3.85	2.64	2.12	1.76	1.80	2.13
9							3.55	3.32	2.10	1.75	1.89	2.12
10							3.36	2.96	2.05	1.81	2.03	2.15
11							3.09	2.84	1.99	1.88	2.10	2.32
12							2.92	3.02	1.97	1.84	2.06	2.77
13							2.79	3.02	1.96	1.88	2.04	2.88
14							2.82	2.82	1.95	1.90	2.04	3.41
15							3.26	2.67	1.98	1.88	2.06	3.67
16							3.18	2.65	2.03	1.84	2.08	3.19
17							3.01	2.56	2.00	1.81	2.06	3.06
18							3.16	2.62	1.98	1.82	2.04	2.74
19							3.90	2.50	1.94	1.82	2.04	2.50
20							3.52	2.40	1.87	1.79	2.01	2.50
21							3.11	2.35	1.88	1.76	1.96	3.17
22							3.00	2.33	1.86	1.77	1.90	3.31
23							2.94	2.38	1.86	1.79	1.93	3.15
24							3.33	2.39	1.84	1.78	1.99	3.02
25							4.09	2.34	1.79	1.76	2.00	2.99
26							5.58	2.30	1.77	1.79	2.00	3.06
27							6.88	2.36	1.80	1.79	2.00	3.28
28						2.86	6.55	2.34	1.79	1.80	1.99	3.36
29						2.70	5.94	2.34	2.09	1.78	2.01	3.32
30						2.62	4.74	2.32	2.11	1.76	2.10	3.21
31							4.08	2.62	.....	1.75	.....	3.16

COAL RIVER AT BRUSHTON, W. VA.

This station, which is located at the Chesapeake and Ohio Railway bridge at Brushton station near Cobbs, W. Va., was established June 23, 1908, to obtain data for water power, water supply, flood control, and storage purposes.

The drainage area above the station is about 379 square miles. Brush Creek enters a short distance below the section.

The datum of the gage has remained unchanged. The records are reliable and accurate. Sufficient data have not yet been collected to enable estimates of the flow to be made.

Discharge measurements of Coal River at Brushton, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 23	A. H. Horton	122	221	2.60	392
July 20	W. G. Hoyt	123	113	1.60	70

Daily gage height, in feet, of Coal River at Brushton, W. Va., for 1908.

[Observer, George W. Fitzpatrick.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	.....	.....	.....	1.7	1.5	1.2	0.9	1.0	1.1
2	.....	.....	.....	.....	.....	.....	1.7	.....	1.1	.9	1.0	1.1
3	.....	.....	.....	.....	.....	.....	1.85	1.35	1.1	.9	1.0	1.0
4	.....	.....	.....	.....	.....	.....	2.0	1.3	1.1	.9	1.0	1.0
5	.....	.....	.....	.....	.....	.....	.....	1.3	1.1	.8	1.0	1.1
6	.....	.....	.....	.....	.....	.....	1.8	1.25	1.1	.8	1.0	1.1
7	.....	.....	.....	.....	.....	.....	1.7	1.25	1.1	.8	1.0	1.2
8	.....	.....	.....	.....	.....	.....	1.7	1.3	1.0	.8	1.0	1.3
9	.....	.....	.....	.....	.....	.....	1.7	1.35	1.0	.8	1.0	1.3
10	.....	.....	.....	.....	.....	.....	1.7	1.45	1.0	.8	1.0	1.3
11	.....	.....	.....	.....	.....	.....	1.6	1.95	1.0	1.1	1.1	1.4
12	.....	.....	.....	.....	.....	.....	.....	1.65	1.0	1.0	1.15	1.75
13	.....	.....	.....	.....	.....	.....	1.45	1.55	.95	1.0	1.1	2.25
14	.....	.....	.....	.....	.....	.....	1.5	1.45	.9	1.0	1.1	2.1
15	.....	.....	.....	.....	.....	.....	1.55	1.4	.9	.9	1.2	1.85
16	.....	.....	.....	.....	.....	.....	1.45	1.35	.9	1.0	1.2	1.7
17	.....	.....	.....	.....	.....	.....	1.35	1.3	.9	1.0	1.2	1.55
18	.....	.....	.....	.....	.....	.....	1.5	1.4	.9	1.0	1.2	1.5
19	.....	.....	.....	.....	.....	.....	.....	1.5	.9	1.0	1.2	1.6
20	.....	.....	.....	.....	.....	.....	1.6	1.4	.9	1.0	1.05	1.55
21	.....	.....	.....	.....	.....	.....	1.5	1.35	.9	1.0	1.1	1.5
22	.....	.....	.....	.....	.....	.....	1.5	1.4	.9	1.0	1.0	1.45
23	.....	.....	.....	.....	.....	2.6	1.5	1.7	.85	1.0	1.0	1.75
24	.....	.....	.....	.....	.....	2.25	1.4	1.5	.8	1.0	1.0	1.9
25	.....	.....	.....	.....	.....	2.1	1.7	1.4	.8	1.0	1.0	2.1
26	.....	.....	.....	.....	.....	2.8	.....	1.35	.8	1.0	1.1	3.8
27	.....	.....	.....	.....	.....	2.35	1.85	1.3	.8	1.0	1.1	3.1
28	.....	.....	.....	.....	.....	.....	2.05	1.25	.85	1.05	1.1	2.5
29	.....	.....	.....	.....	.....	1.9	1.9	1.2	.9	1.1	1.1	2.3
30	.....	.....	.....	.....	.....	1.75	1.75	1.2	.9	1.0	1.1	2.25
31	.....	.....	.....	.....	.....	.....	1.6	1.2	.....	1.0	.....	2.35

COAL RIVER AT TORNADO, W. VA.

This station is located at the highway bridge near Tornado, W. Va. It was established June 24, 1908, to obtain data for water-power, water-supply, flood-control, and storage purposes.

The datum of the gage has not been changed. The records are reliable and accurate. The low-water gage heights may be affected by a dam a short distance below the section. Sufficient data have not yet been collected to enable estimates of the discharge to be made.

Discharge measurements of Coal River at Tornado, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 22	A. H. Horton	152	845	2.76	353
June 24	O'Neill and Chapman	150	866	2.89	503
July 20	W. G. Hoyt	173	863	2.66	131
Do	do	173	830	2.55	[a] 145

[a] Surface measurement.

Daily gage height, in feet, of Coal River at Tornado, W. Va., for 1908.

[Observer, Dr. P. E. Eagan.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	.....	.....	.....	2.25	2.50	2.30	2.22	2.29	2.46
2	.....	.....	.....	.....	.....	.....	2.17	2.50	2.26	2.22	2.29	2.45
3	.....	.....	.....	.....	.....	.....	2.10	2.42	2.16	2.22	2.29	2.48
4	.....	.....	.....	.....	.....	.....	.....	2.41	2.02	2.18	2.28	2.48
5	.....	.....	.....	.....	.....	.....	2.22	2.52	1.94	2.22	2.27	2.48
6	.....	.....	.....	.....	.....	.....	2.40	2.40	1.92	2.22	2.27	2.48
7	.....	.....	.....	.....	.....	.....	2.46	2.38	2.00	2.18	2.27	2.44
8	.....	.....	.....	.....	.....	.....	2.42	2.40	1.82	2.13	2.38	2.44
9	.....	.....	.....	.....	.....	.....	2.39	2.42	1.92	2.15	2.39	2.58
10	.....	.....	.....	.....	.....	.....	2.38	2.41	2.05	2.17	2.32	2.54
11	.....	.....	.....	.....	.....	.....	2.20	2.52	2.11	2.27	2.29	2.61
12	.....	.....	.....	.....	.....	.....	2.09	2.64	2.20	2.27	2.27	2.72
13	.....	.....	.....	.....	.....	.....	2.15	2.58	2.33	2.34	2.39	2.82
14	.....	.....	.....	.....	.....	.....	2.42	2.58	2.32	2.25	2.39	2.98
15	.....	.....	.....	.....	.....	.....	2.55	2.52	2.34	2.23	2.22	2.88
16	.....	.....	.....	.....	.....	.....	2.53	2.55	2.38	2.29	2.39	2.77
17	.....	.....	.....	.....	.....	.....	2.44	2.35	2.30	2.21	2.42	2.70
18	.....	.....	.....	.....	.....	.....	2.82	2.40	2.17	2.21	2.41	2.67
19	.....	.....	.....	.....	.....	.....	2.95	2.48	2.14	2.27	2.41	2.67
20	.....	.....	.....	.....	.....	.....	2.58	2.48	2.22	2.22	2.46	.....
21	.....	.....	.....	.....	.....	.....	2.54	2.48	2.17	2.21	2.41	.....
22	.....	.....	.....	.....	.....	2.80	2.49	2.48	2.17	2.26	2.54	.....
23	.....	.....	.....	.....	.....	2.99	2.46	2.52	2.22	2.32	2.44	.....
24	.....	.....	.....	.....	.....	2.88	2.47	2.62	2.23	2.25	2.41	.....
25	.....	.....	.....	.....	.....	2.74	2.70	2.58	2.23	2.35	2.41	.....
26	.....	.....	.....	.....	.....	2.8	2.88	2.42	2.23	2.44	2.43	.....
27	.....	.....	.....	.....	.....	2.88	2.88	2.37	2.22	2.47	2.51	.....
28	.....	.....	.....	.....	.....	2.65	3.02	2.40	2.22	2.47	2.51	.....
29	.....	.....	.....	.....	.....	2.52	2.84	2.42	2.28	2.47	2.56	.....
30	.....	.....	.....	.....	.....	2.45	2.65	2.28	2.25	2.47	2.50	.....
31	.....	.....	.....	.....	.....	.....	2.60	2.26	.....	2.39	.....	.....

POCOTALIGO RIVER AT SISSONVILLE, W. VA.

This station is located at the highway bridge near the post-office at Sissonville, W. Va. It was established June 26, 1908, to obtain data for use in studying water-power, water-supply, flood-control, and storage problems.

A dam and small power plant above the station may modify the flow in low water. The datum of the gage has not been changed. The records are reliable and accurate. Sufficient data have not been collected to enable estimates of the flow to be made.

Discharge measurements of Pocotaligo River at Sissonville, W. Va., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 26	O'Neill and Chapman	75	100	2.16	65
July 22	W. G. Hoyt	79	108	2.32	68

Daily gage height, in feet, of Pocotaligo River at Sissonville, W. Va., for 1908.

[Observer, W. H. Sisson.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1							1.40	1.83	1.24	1.18	1.09	1.24
2							1.38	1.56	1.23	1.22	1.09	1.22
3							1.49	1.50	1.24	1.24	1.09	1.22
4							2.78	1.70	1.36	1.24	1.09	1.23
5							2.58	1.85	1.48	1.19	1.09	1.21
6							2.27	1.40	1.32	1.19	1.11	1.21
7							2.00	1.48	1.18	1.24	1.10	1.21
8							2.35	1.50	1.24	1.20	1.11	1.22
9							2.18	1.42	1.19	1.18	1.11	1.23
10							1.68	1.35	1.18	1.18	1.09	1.28
11							1.82	1.25	1.18	1.17	1.10	1.28
12							1.60	1.40	1.06	1.18	1.10	1.48
13							1.78	1.54	1.13	1.17	1.10	1.86
14							2.45	1.35	1.23	1.19	1.10	2.16
15							4.90	1.32	1.18	1.17	1.10	2.20
16							2.76	1.30	1.16	1.17	1.09	1.50
17							2.34	1.05	1.14	1.17	1.09	1.64
18							4.38	1.36	1.14	1.21	1.13	1.68
19							8.44	2.18	1.16	1.21	1.11	1.64
20							4.05	2.25	1.16	1.16	1.11	1.60
21							2.48	1.65	1.15	1.13	1.18	1.54
22							2.42	1.76	1.15	1.15	1.20	1.49
23							2.16	1.40	1.15	1.13	1.20	1.64
24							2.10	1.32	1.15	1.11	1.22	1.70
25							1.98	1.56	1.19	1.13	1.23	1.65
26						2.17	2.33	1.56	1.30	1.11	1.22	2.36
27						1.25	3.00	1.53	1.30	1.08	1.20	2.41
28						1.32	3.00	1.64	1.36	1.09	1.18	2.26
29						1.28	2.55	2.01	1.30	1.09	1.20	2.28
30						1.30	2.10	2.06	1.30	1.11	1.20	2.18
31							1.58	1.94		1.13		2.19

MIAMI RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The drainage basin of Miami River lies in southwestern Ohio and southeastern Indiana, one-third of the area being in the latter State. The river is formed in Logan County by small streams rising in Auglaize and Hardin counties, Ohio, flows in a slight southwesterly direction and joins Ohio River at the Indiana state line. Stillwater River from the west and Mad River from the east, both tributary near Dayton, are the only important tributaries in the upper part of the basin. Whitewater River is tributary from the west a few miles above the mouth of the river. Nearly all of the drainage area of the Whitewater is in Indiana. The length of the Miami is about 140 miles (map measurement). The total drainage area is about 5,400 square miles.

The drainage basin is fairly regular in shape. The valleys of the headwaters as far down as the vicinity of Dayton are narrow and comparatively shallow. Below Dayton the valley is broad and open, flanked by low hills. Along this section the river occupies the preglacial drainage lines which are only partially filled with glacial

deposits. The contrast between the southern and northern portion of the drainage basin is due not to the work of the present streams, but to the less complete concealment of preglacial drainage lines. The surface of the surrounding country is level or rolling. The elevation of the sources of the river is about 1,000 feet; at Dayton the elevation is about 725 feet; at Hamilton it is about 565 feet; at the mouth of the river the elevation is 428 feet.

There are no forested areas in this drainage basin, what timber there is being in small groves or wood lots. The mean annual rainfall is about 42 inches. The winters are comparatively mild in the northern part of the basin. The snowfall is not heavy and ice does not form very thick. In the southern part winter conditions are mild, snowfall is light, ice forms to some extent where the current is sluggish.

The basin affords a few opportunities for storage. Lewistown and Loramie reservoirs, near the headwaters of the Miami, are used to supply water for the Miami and Erie Canal. These reservoirs were constructed about 1830; construction of reservoirs at the present time would be prohibited by the cost of the overflowed land. It is probable that other sites might be found at the headwaters of the tributaries.

The average fall of Miami River is from 3 to 4 feet per mile. This high average slope is favorable to the development of water power. The bed and banks of the stream, however, are not as a rule suitable for the foundation of dams, as they are generally composed of gravel and alluvial soil, and the banks are low. These conditions are met by building low dams to divert the water into canals. The gravel and sandy soil is favorable for the formation of springs, of which there are a great many in the basin. These springs tend to keep up the flow during dry spells and increase the value of the stream for water power. At different places water is diverted from the river to feed the Miami and Erie Canal which parallels the river from Hamilton to Piqua and thence along Loramie River, crossing the divide at its sources. Numerous power plants situated along this canal have leased water rights from the State, in most cases very cheaply.

The following gaging stations have been maintained in this drainage basin:

Miami River at Dayton, Ohio, 1905–1908.
Mad River near Springfield, Ohio, 1904–1906.

MIAMI RIVER AT DAYTON, OHIO.

This station is located at the Main Street Bridge at Dayton, Ohio. The gage, which belongs to the United States Weather Bureau, was established October 1, 1892; it was repaired in 1903, and also in 1904.

On March 18, 1905, the United States Geological Survey began taking discharge measurements to obtain data for water-power, water-supply, and pollution problems. The United States Weather Bureau supplies the United States Geological Survey with daily gage heights. The station is one-half mile below the mouth of Mad River and 1 mile above Wolf Creek, which is tributary from the west. The drainage area above the station is about 2,450 square miles.

There is a power plant about 1 mile above the station which may divert water around the section, and there is also a dam on the Mad River about two miles above the section that diverts water into the Miami and Erie Canal.

The winter conditions are comparatively mild, and ice generally causes little trouble as it rarely lasts for a month at a time.

The datum of the gage has probably remained unchanged since the date of establishment in 1892.

This station has not been inspected since June, 1906, and nothing is known about the existing conditions, hence no monthly discharge is published for 1907 and 1908.

Daily gage height, in feet, of Miami River, at Dayton, Ohio, for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4.5	3.1	2.5	2.0	2.3	5.0	2.0	2.2	1.0	1.5	1.2	1.3
2	4.0	3.4	2.5	2.4	2.2	4.0	1.9	2.1	1.0	1.3	1.3	1.3
3	4.1	3.1	4.2	2.3	2.1	4.3	1.8	2.0	1.0	1.2	1.2	1.2
4	11.2	3.1	3.5	2.3	2.1	4.0	1.7	2.0	1.2	2.9	3.4	1.2
5	11.7	3.0	3.1	2.3	2.1	4.3	1.7	1.9	1.3	2.4	3.5	1.1
6	8.0	3.4	3.0	2.2	2.1	4.3	1.6	2.6	1.3	2.1	2.9	1.1
7	6.1	2.9	2.9	2.3	2.0	3.6	1.7	2.5	1.2	1.8	2.5	1.1
8	6.0	2.9	2.8	2.2	2.0	6.5	1.8	2.1	1.0	2.0	2.3	1.1
9	7.3	2.8	2.8	2.2	2.0	5.5	1.7	1.9	1.0	2.0	2.1	1.0
10	6.7	2.8	2.8	2.2	2.0	5.3	2.9	1.7	2.0	1.9	1.8	1.0
11	5.7	2.8	2.8	2.1	2.0	7.9	4.6	1.6	3.0	1.6	1.8	1.4
12	4.5	2.7	2.8	2.1	2.0	4.6	7.3	1.5	2.4	1.5	1.7	1.7
13	4.4	2.7	10.8	2.1	1.9	5.9	5.1	1.4	2.0	1.3	1.6	1.7
14	5.0	2.7	15.2	2.1	1.9	7.0	3.5	1.3	1.6	1.3	1.5	1.5
15	5.9	2.8	11.8	2.0	1.9	5.2	3.1	1.2	1.3	1.3	1.4	1.8
16	6.4	2.7	8.0	2.0	1.8	4.0	2.8	1.1	1.3	1.2	1.4	1.8
17	6.0	2.7	6.2	1.9	1.8	3.3	3.0	1.1	1.3	3.3	1.3	2.2
18	8.1	2.7	5.0	1.9	1.8	3.0	4.7	1.3	1.2	2.6	1.3	2.0
19	8.6	2.7	4.6	1.8	1.9	2.7	5.5	1.2	3.3	2.1	1.3	1.9
20	12.0	2.8	4.6	1.8	1.9	2.5	4.8	1.1	2.6	1.3	1.3	1.8
21	10.5	2.9	4.5	1.7	1.8	2.3	4.0	1.1	2.1	1.1	1.5	1.6
22	7.4	2.9	4.1	1.7	1.8	2.0	3.3	1.1	2.5	1.1	1.5	1.7
23	5.3	2.8	3.5	1.7	1.6	2.9	3.0	1.0	2.1	1.0	1.5	3.8
24	4.5	2.6	3.1	3.0	1.6	2.6	3.0	1.0	1.8	1.0	1.6	6.5
25	4.0	2.6	2.8	2.9	1.7	2.5	2.7	1.0	1.6	1.0	1.5	5.5
26	3.4	2.5	2.8	3.3	2.5	2.4	3.5	1.0	1.4	1.0	1.4	4.2
27	3.4	2.5	2.6	3.8	2.7	2.5	3.7	1.0	1.3	1.3	1.3	3.6
28	3.3	2.4	2.4	3.2	2.3	2.4	3.1	1.2	1.2	1.2	1.3	3.2
29	3.2	.....	2.0	2.9	2.2	2.3	3.1	1.3	2.0	1.1	1.2	3.6
30	3.1	.....	2.0	2.5	2.0	2.1	2.5	1.3	1.8	1.1	1.2	4.0
31	3.0	.....	2.0	.....	1.9	.....	2.2	1.2	.....	1.1	.....	6.6
1908.[a]												
1	5.4	.....	3.1	3.6	2.4	1.9	1.4	1.1	1.9	.5	.8	1.0
2	5.4	.....	10.3	5.0	2.4	1.9	1.2	1.1	1.7	.5	.8	1.0
3	4.0	.....	13.3	4.9	2.5	1.9	1.3	1.0	.5	.5	.8	1.0
4	3.3	.....	8.3	3.3	2.6	1.8	1.3	1.0	.5	.5	.8	1.0
5	3.0	.....	6.4	3.1	5.5	1.8	2.2	1.2	.5	.5	.7	1.0

[a] See note at end of table, next page.

Daily gage height, in feet, of Miami River at Dayton, Ohio, for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
6	2.9	9.1	11.7	3.1	7.4	1.7	2.3	1.5	0.8	0.5	0.7	1.0
7	2.8	5.3	11.2	3.1	8.8	1.7	1.9	1.3	.5	.5	.6	1.4
8	2.7	3.5	7.5	3.2	9.4	1.7	1.7	1.2	.5	.5	.7	1.3
9	2.4	3.7	7.2	6.4	7.4	1.6	1.5	1.2	.5	.5	.7	1.4
10	2.2	3.0	6.5	5.7	5.9	1.6	1.4	1.1	.5	.5	.7	1.5
11	2.0	3.6	5.5	5.0	4.5	1.5	1.3	1.2	.5	.7	.7	1.4
12	2.8	4.4	4.8	4.3	3.9	1.5	1.3	1.5	.5	.5	1.0	1.5
13	5.5	4.5	4.2	3.5	3.4	1.5	1.3	1.3	.5	.5	.9	1.8
14	4.8	4.9	3.8	3.1	3.0	1.6	1.2	1.3	.5	.5	.8	1.9
15	3.7	13.0	3.5	3.0	2.9	1.4	1.8	1.2	.5	.5	1.4	1.9
16	3.2	13.0	3.6	3.1	2.8	1.4	1.4	1.0	.5	.4	.8	1.9
17	2.9	8.3	3.1	3.0	2.7	1.3	1.3	1.0	.5	.4	.8	1.9
18	2.7	5.5	3.2	2.9	2.5	1.3	1.4	1.0	.5	.9	.8	1.9
19	2.5	4.6	8.2	2.8	2.5	1.3	1.4	1.2	.5	.5	.9	1.9
20	2.3	3.8	10.8	2.7	2.7	2.2	1.6	1.1	.5	.5	.8	1.9
21	2.3	3.4	8.0	2.6	2.5	3.7	1.5	.9	.5	.7	.8	1.9
22	2.3	3.2	8.8	2.4	2.4	3.5	1.4	.9	.5	.7	1.4	1.9
23	2.5	3.0	5.8	2.3	2.3	3.1	1.3	.9	.5	.7	.9	1.9
24	2.3	2.7	4.6	2.2	2.1	2.4	1.2	.9	.5	.7	.9	1.9
25	2.3	4.5	4.1	2.2	2.0	1.8	2.5	2.0	.5	1.0	.9	1.9
26	2.3	4.9	3.6	2.2	2.0	1.7	1.9	2.0	.5	.7	.9	1.9
27	2.3	4.0	3.3	2.3	2.0	1.5	1.5	2.0	.5	.7	1.0	1.9
28	2.2	3.9	3.0	2.9	2.0	1.4	1.5	2.0	.5	.7	1.0	1.9
29	2.0	3.4	4.3	2.8	1.9	1.4	1.4	1.9	.5	.9	1.0	1.9
30	.....	.....	3.5	2.5	1.9	1.5	1.3	1.9	.5	1.0	1.0	1.9
31	.....	.....	3.6	.....	1.9	.....	1.2	1.9	.....	.8	.....	1.9

NOTE.—River was frozen, January 30 to February 5, 1908.

WABASH RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The drainage area of Wabash River lies in Ohio, Illinois, and Indiana, slightly more than two-thirds of the area being in the last-named State.

The Wabash rises in the southwestern part of Mercer County, Ohio, flows northwestward across the Indiana state line to Huntington in Huntington County, and thence slightly southwestward to Logansport in Cass County. At Logansport the river turns more to the southwest until it reaches Covington in Fountain County, where it finally turns south, continuing in this direction to Terre Haute, below which its course is slightly southwestward to its junction with Ohio River about 30 miles below Mount Vernon, Ind. From a point about 15 miles below Terre Haute to the mouth it forms the boundary line between Indiana and Illinois.

The important tributaries, beginning at the sources and following down the left bank, are as follows: Salamonie and Mississinewa rivers; Wild Cat, Sugar, and Raccoon creeks; White and Patoka rivers. On the right bank are: Little, Eel, Tippecanoe, Vermillion, Embarrass, Little Wabash, and Saline rivers. White River is much the largest tributary. The length of the Wabash is about 410 miles

(map measurement). The total drainage area is approximately 33,000 square miles.

The drainage basin is regular in shape. Only a small part of the entire drainage area lies outside the glaciated region. The Wabash and the West Branch of the White lie within that area for their entire length. The East Branch of the White leaves the glaciated area in the lower part of its course, and enters it again about 20 miles above its mouth. All the rock formations are more or less covered with glacial drift in the form of sand and gravel ridges, and till plains. In general the surface of the country is flat, with a general slope toward the southwest. In the unglaciated section in southern Indiana the country is more uneven. Rock outcrops at many places in the bed of the main stream and its tributaries.

Along Little Wabash River, which enters the Wabash about 15 miles above its mouth, the drainage and flood control are subjects of considerable interest. The Department of Agriculture is making a study of conditions, with a view of developing a plan for reclaiming and protecting areas that are overflowed during floods. Portions of the river have already been mapped for use in this study.

The elevation of the sources of Wabash River is about 1,000 feet; at Huntington the elevation is 699 feet; at Logansport it is 583 feet; at Terre Haute, 478 feet; at the mouth of White River, 376 feet; at the mouth, 311 feet.

The drainage basin can not be called forested, as it is thickly settled and highly cultivated. Any timber standing exists only as groves or woodlots, generally of small extent.

The mean annual rainfall is about 40 inches. The winter conditions in the northern part of the basin are comparatively severe. The snowfall is not heavy, but ice forms on the streams about 1 foot in thickness; in the lower part of the basin the conditions are mild and ice does not form very thick.

Storage possibilities have not been investigated; the high value of farm land in this section would undoubtedly prohibit the construction of reservoirs.

The main stream and its tributaries afford good opportunities for water power, especially on the East and West branches of the White, where the fall is much more than on the Wabash. In general, the water power is not being developed. In some sections water power has to compete with cheap fuel, and the point has not been reached where water power can successfully compete with steam power.

At the headwaters of Wabash River, in Mercer County, Ohio, is a large reservoir, called Grand Reservoir, that is used to store water which is supplied to the Miami and Erie Canal. This reservoir receives the drainage from about 200 square miles, and its capacity

is about 4,000,000,000 cubic feet. The water that is thus fed to the canal is diverted from the basin of the Wabash River.

The Wabash is navigable for part of its length.

The following gaging stations have been maintained in this drainage basin:

Wabash River at Logansport, Ind., 1903–1906.
Wabash River at Lafayette, Ind., 1901–1903.
Wabash River at Terre Haute, Ind., 1902–1903 and 1905–1906.
Wabash River, at Mount Carmel, Ind., 1884–1908 (gage height records by the U. S. Weather Bureau).
Tippecanoe River at Delphi, Ind., 1903–1906, 1908.
West Branch of White River at Indianapolis, Ind., 1904–1906.
Eel River at Cataract, Ind., 1903–1906.
East Branch of White River at Shoals, Ind., 1903–1906, 1908.
Little Wabash River[a] at Clay City, 1908.
Little Wabash River[a] at Golden Gate, 1908.
Little Wabash River[a] at Carmi, 1908.
Skillet Fork[a] at Wayne City, 1908.
Skillet Fork[a] at Mill Shoals, 1908.

WABASH RIVER AT MOUNT CARMEL, ILL.

This station is located at the Southern Railway bridge at Mount Carmel, Ill. The gage at this station was established June 16, 1884; it formerly belonged to the United States Engineer Corps, but was rebuilt in November, 1904, by the United States Weather Bureau, who furnish the gage readings. On October 10, 1908, the United States Geological Survey started taking discharge measurements to obtain data for water power, flood control, storage, and navigation problems.

Patoka River is tributary immediately above the station. Measurements of extreme floods may be difficult to obtain on account of the overflow channels about 2 miles east of the station.

Winter conditions are mild in this locality. Ice does not form very thick and rarely lasts a month at a time.

The datum of the gage has probably remained unchanged since it was established in 1884.

The following discharge measurement was made October 10, 1908:

Width, 772 feet; area, 5,400 square feet; gage height, 1.15 feet; discharge, 2,620 second-feet.

[a] Gaging stations on Little Wabash River are maintained in cooperation with the State of Illinois.

Daily gage height, in feet, of Wabash River at Mount Carmel, Ill., for 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14.9	5.4	19.7	13.4	11.4	8.0	3.5	2.3	0.8	1.1	1.0	1.6
2	15.1	.....	19.4	14.3	11.4	7.8	3.3	2.2	.8	1.1	1.0	1.7
3	15.2	.....	19.2	15.4	11.1	7.0	3.1	2.2	.7	1.1	.8	1.7
4	15.4	.....	19.2	16.3	10.6	6.5	3.1	2.2	.7	1.1	.8	1.7
5	15.5	.....	19.3	16.4	12.4	6.5	3.1	2.2	.7	1.1	.8	1.6
6	15.3	7.9	19.3	16.5	16.7	6.2	3.1	2.1	.6	1.1	.8	1.6
7	14.9	12.1	19.7	16.1	18.9	6.0	3.1	2.0	.5	1.0	.8	1.6
8	13.9	13.4	20.1	16.0	20.5	5.8	3.1	1.9	.5	1.0	.8	1.6
9	13.8	14.7	20.8	16.6	22.3	5.6	3.1	1.9	.4	1.0	.8	1.6
10	13.0	15.1	21.4	17.0	23.5	5.6	3.1	1.9	.4	.9	.8	1.6
11	10.5	15.6	22.0	17.4	24.5	5.5	3.1	1.8	.4	.9	.8	1.6
12	9.5	15.6	22.6	17.7	24.8	5.3	3.1	1.7	.3	.9	.8	1.6
13	8.8	15.5	22.9	18.0	24.9	5.1	3.1	1.6	.8	.9	.8	1.5
14	10.6	16.1	23.3	18.3	24.7	4.9	3.0	1.6	1.2	.8	.8	1.5
15	12.0	18.1	23.5	18.5	24.5	4.7	2.9	3.1	1.3	.8	.8	1.5
16	12.9	19.6	23.4	18.5	24.0	4.5	2.7	2.6	1.3	.8	.8	1.5
17	13.3	20.1	22.9	18.0	23.7	4.4	2.5	2.6	1.2	.8	.8	1.5
18	13.4	20.8	22.2	16.8	22.9	4.3	2.4	3.2	1.1	.8	.8	1.4
19	12.2	21.5	21.3	15.3	21.9	4.2	2.3	3.0	1.1	.8	.8	1.4
20	10.9	22.0	20.3	13.6	21.0	4.1	2.2	3.0	1.0	.8	.8	1.4
21	9.1	22.2	19.0	12.0	20.0	4.0	2.1	2.3	1.0	.8	.8	1.4
22	8.2	22.6	18.0	11.1	19.3	3.9	2.3	2.0	.9	.8	.8	1.4
23	7.7	22.9	17.0	10.2	18.6	4.5	2.4	2.0	.8	.8	.8	1.4
24	7.2	23.2	16.6	9.2	17.9	4.4	2.4	1.9	.8	.8	.8	1.4
25	6.8	23.1	16.4	9.1	17.1	4.2	2.3	1.8	.8	.8	.8	1.4
26	6.4	22.8	16.3	10.2	16.4	4.2	2.3	1.6	.8	.8	.8	1.4
27	6.0	22.0	16.0	10.7	15.2	4.1	2.3	1.5	.8	.8	.8	1.4
28	5.7	21.1	15.2	11.5	13.8	4.0	2.4	1.2	.9	.8	1.0	1.4
29	5.6	20.3	14.8	11.8	11.3	3.9	2.8	1.1	1.0	.8	1.2	1.4
30	5.5	.....	14.1	11.4	9.4	3.7	2.6	1.0	1.1	.8	1.4	1.4
31	5.4	.....	13.4	.....	8.7	.....	2.3	.9	.....	.8	.....	1.4

NOTE.—River frozen February 2–5, 1908.

TIPPECANOE RIVER NEAR DELPHI, IND.

This station is located at the highway bridge at Springboro, Ind., 5 miles west of Delphi. It was established March 14, 1903; discontinued July 20, 1906; reestablished November 2, 1908; and again discontinued early in 1909. The data collected at this station are for use in studying water power, water supply, and pollution problems.

Winter conditions are quite severe in this vicinity and the relation between discharge measurements and gage heights is often affected during the winter periods by ice a foot or more in thickness.

The datum of the gage has remained unchanged since the establishment of the station. The bed of the river is rocky, rough, and permanent. A good rating curve has been developed at this point. The gage observer is paid by G. E. Waesche.

The following discharge measurement was made November 2, 1908:

Width, 214 feet; area, 188 square feet; gage height, 2.69 feet; discharge, 252 second-feet.

Daily gage height, in feet, of Tippecanoe River near Delphi, Ind., for 1908.

[Observer, Albert O. Imler.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	.....	3.00	11	2.68	2.70	21	2.67	2.72
2	2.67	2.95	12	2.60	2.70	22	2.70	2.70
3	2.68	2.90	13	2.60	2.72	23	2.75	2.68
4	2.78	2.85	14	2.59	2.75	24	2.75	3.00
5	2.72	2.82	15	2.60	2.73	25	2.80	2.95
6	2.62	2.80	16	2.60	2.75	26	2.82	2.90
7	2.62	3.00	17	2.59	2.82	27	2.85	2.85
8	2.68	2.90	18	2.65	2.80	28	2.86	2.82
9	2.63	2.82	19	2.70	2.78	29	2.89	2.80
10	2.64	2.75	20	2.70	2.75	30	2.95	2.75
						31	.....	2.70

Rating table for Tippecanoe River near Delphi, Ind., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.60	170	2.90	470
2.70	260	3.00	585
2.80	360		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on one discharge measurement made during 1908 and the form of the 1904 to 1906 curve, and is well defined.

Monthly discharge of Tippecanoe River near Delphi, Ind., for 1908.

[Drainage area, 1,890 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
November 2–30	528	162	268	0.142	0.15	A.
December	585	242	377	.199	.23	A.

EAST BRANCH OF WHITE RIVER AT SHOALS, IND.

This station is located at the highway bridge between East and West Shoals, Ind. The bridge is a short distance above the Baltimore and Ohio Southwestern Railroad bridge. This station was established June 25, 1903; discontinued July 21, 1906; and reestablished October 12, 1908. The data collected are for use in studying water power, water supply, and pollution problems.

The bed of the river is of solid rock and the estimates of the flow at this station should be excellent. Gage readings are taken from December 1 to May 31 by the United States Weather Bureau; 61.0 feet should be added to reduce their readings to the same datum as those in this publication. The winter conditions are mild in this vicinity and the winter flow is affected but little by ice. The datum

of the gage has remained unchanged. The records are reliable and accurate.

The following measurement was made October 12, 1908:

Width, 275 feet; area, 331 square feet; gage height, 63.20 feet; discharge, 345 second-feet.

Daily gage height, in feet, of East Branch of White River at Shoals, Ind., for 1908.

[Observer, O. H. Greist.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						65.50					63.20	63.40
2					67.40	65.50					63.20	63.40
3					67.80	65.40					63.19	63.40
4					68.00	65.30					63.19	63.40
5					77.50	65.20					63.19	63.30
6					81.80	65.00					63.19	63.30
7					83.80	64.90					63.19	63.30
8					85.60	64.80					63.20	63.30
9					87.10	64.90					63.19	63.30
10					87.90	64.80					63.19	63.30
11					88.20	64.70					63.20	63.30
12					88.20	64.70				63.18	63.20	63.30
13					87.50	64.70		64.80		63.19	63.20	63.30
14					85.90	64.60				63.19	63.20	63.30
15					82.60	64.60				63.19	63.20	63.30
16					76.60	64.50				63.19	63.20	63.30
17					69.70	64.50				63.19	63.20	63.30
18					67.40	64.40				63.20	63.20	63.30
19					66.70	64.40				63.19	63.20	63.30
20					66.50	64.30				63.20	63.20	63.30
21					66.30	64.30				63.19	63.20	63.30
22					66.20	64.20				63.20	63.20	63.30
23					66.00	64.20				63.18	63.21	63.30
24					66.00	64.20				63.20	63.28	63.30
25					65.70	64.60				63.19	63.25	63.30
26					65.50	64.60				63.19	63.30	63.30
27					65.40	64.40				63.19	63.40	63.30
28					65.30	64.30				63.19	63.50	63.30
29					65.40	64.20				63.22	63.45	63.30
30					65.40	64.10				63.20	63.40	63.30
31					65.50					63.19		63.30

Rating table for East Branch of White River at Shoals, Ind., for 1906 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
63.20	340	64.60	2,070	66.00	5,860	67.80	9,700
63.30	410	64.70	2,260	66.10	6,120	68.00	10,080
63.40	490	64.80	2,460	66.20	6,360	68.20	10,460
63.50	580	64.90	2,680	66.30	6,580	68.40	10,840
63.60	670	65.00	2,920	66.40	6,800	68.60	11,220
63.70	770	65.10	3,180	66.50	7,020	68.80	11,590
63.80	880	65.20	3,460	66.60	7,240	69.00	11,950
63.90	1,000	65.30	3,750	66.70	7,460	69.20	12,310
64.00	1,130	65.40	4,050	66.80	7,680	69.40	12,670
64.10	1,270	65.50	4,360	66.90	7,900	69.60	13,030
64.20	1,410	65.60	4,670	67.00	8,100	69.80	13,390
64.30	1,560	65.70	4,980	67.20	8,500	70.00	13,750
64.40	1,720	65.80	5,280	67.40	8,900	71.00	15,400
64.50	1,890	65.90	5,580	67.60	9,300	72.00	17,000

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 22 discharge measurements made during 1903 to 1906 and 1908. It is well defined between gage heights 63.2 feet and 65.4 feet. Above gage height 72.0 feet the rating curve is a tangent, the difference being 150 per tenth.

Monthly discharge of East Branch of White River at Shoals, Ind., for 1908.

[Drainage area, 4,900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
May 2–31	41,300	3,750	18,200	0.371	4.14	B.
June	4,360	1,270	2,290	.467	.52	A.
October 12–31	354	328	336	.069	.05	A.
November	580	334	369	.075	.08	A.
December	490	410	420	.086	.10	A.

LITTLE WABASH RIVER NEAR CLAY CITY, ILL.

This station is located at the Baltimore and Ohio Southwestern Railroad bridge, 1½ miles east of Clay City, Ill. It was established October 3, 1908, to obtain data to be used in studying drainage and flood-control problems.

The drainage area above the station is about 818 square miles.

The gage datum has not been changed. The records are accurate and reliable. No discharge measurements were made at this station during 1908.

Daily gage height, in feet, of Little Wabash River near Clay City, Ill., for 1908.

[Observer, William F. Davis.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	5.8	6.3	11	.....	5.8	6.1	21	5.9	5.8	6.0
2	.....	5.8	6.3	12	5.9	5.8	6.1	22	5.9	5.8	5.9
3	.....	5.8	7.8	13	5.9	5.8	.....	23	5.9	5.8	5.9
4	.....	5.8	7.3	14	5.9	5.8	6.0	24	5.9	5.8	5.9
5	.....	5.8	7.3	15	5.9	5.8	6.0	25	5.9	6.0	5.9
6	.....	5.8	.....	16	5.9	5.8	6.0	26	5.9	6.0	5.9
7	.....	5.8	6.3	17	5.9	5.8	6.0	27	5.9	6.0	5.9
8	.....	5.8	6.3	18	5.9	5.8	6.0	28	5.9	6.0	5.9
9	.....	5.8	6.1	19	5.9	5.8	6.0	29	5.9	.....	5.9
10	.....	5.8	6.1	20	5.9	5.8	6.0	30	5.8	6.3	5.9
								31	5.9	.....	5.9

LITTLE WABASH RIVER NEAR GOLDEN GATE, ILL.

This station, which is located at the Southern Railway bridge 1 mile west of Golden Gate, Ill., was established August 17, 1908, to collect data for use in drainage and flood-control investigations. Elm Creek enters from the west about 3 miles above the station. The drainage area above the section is about 1,820 square miles.

The gage datum has not been changed and the records are accurate and reliable. Sufficient data have not been collected at this station to enable the flow to be determined. The low-water measurements should be used with caution until verified by additional measurements.

The following measurement was made July 17, 1908:

Width, 75 feet; area, 301 square feet; gage height, 2.6 feet; discharge, 19 second-feet.

Daily gage height, in feet, of Little Wabash River near Golden Gate, Ill., for 1908.

[Observer, Henry Chalcraft.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.0	2.0	1.9	2.6	16	.....	1.8	2.1	2.0	2.1
2	.....	2.0	2.0	1.8	2.6	17	1.9	1.7	2.0	2.0	2.1
3	.....	1.9	1.9	1.9	2.6	18	2.0	1.8	2.0	2.1	2.1
4	.....	1.9	1.9	1.9	2.5	19	2.0	1.8	2.0	2.1	2.1
5	.....	1.8	1.9	1.9	3.5	20	2.1	1.7	2.2	2.1	2.0
6	.....	1.9	2.0	1.9	3.5	21	2.2	1.7	2.1	2.1	2.0
7	.....	1.9	2.0	2.0	3.4	22	2.2	1.7	2.0	2.3	1.9
8	.....	1.9	2.0	2.0	3.1	23	2.0	1.7	1.9	2.2	1.9
9	.....	1.8	2.0	2.0	2.7	24	2.1	1.7	1.9	2.2	1.9
10	.....	1.8	2.0	2.1	2.5	25	2.1	1.7	1.9	2.2	1.7
11	.....	1.8	2.5	2.1	2.5	26	2.0	1.8	1.8	2.5	1.7
12	.....	1.8	2.1	2.1	2.4	27	2.2	1.8	1.8	2.6	1.6
13	.....	1.8	2.1	2.1	2.3	28	2.2	2.0	1.8	2.7	1.7
14	.....	1.8	2.1	2.0	2.2	29	2.0	2.0	1.8	2.7	1.7
15	.....	1.8	2.0	2.0	2.2	30	2.0	1.9	1.9	2.7	1.8
						31	2.0	.....	1.9	.....	1.8

LITTLE WABASH RIVER AT CARMI, ILL.

This station which is located at the highway bridge in the town of Carmi, Ill., was established October 9, 1908, to obtain data of use in studying drainage, flood control, and levee construction. Skillet Fork enters from the west about 6 miles above the station. The drainage area above the section is about 3,120 square miles.

Extreme floods on Ohio River or Wabash River produce backwater at this station.

The gage datum has not been changed. The records are reliable and accurate, but during floods are affected by backwater as stated above. No discharge measurements were made during 1908.

Daily gage height, in feet, of Little Wabash River at Carmi, Ill., for 1903.

[Observer, Noah Weigant.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	1.7	2.0	11	.....	1.6	2.1	21	2.1	1.7	1.9
2	.....	1.7	2.0	12	1.7	1.7	2.0	22	1.9	1.7	1.9
3	.....	1.6	1.9	13	1.7	1.7	2.0	23	1.8	1.7	1.9
4	.....	1.6	1.9	14	1.7	1.7	2.0	24	1.8	2.0	1.9
5	.....	1.6	1.9	15	1.7	1.7	1.9	25	1.7	2.0	1.9
6	.....	1.6	1.9	16	1.8	1.7	1.9	26	1.7	2.1	1.8
7	.....	1.6	2.0	17	1.8	1.7	1.9	27	1.7	2.1	1.8
8	.....	1.6	2.2	18	1.8	1.7	1.9	28	1.7	2.1	1.8
9	.....	1.6	2.2	19	1.8	1.7	1.9	29	1.7	2.1	1.8
10	.....	1.6	2.2	20	1.8	1.7	1.9	30	1.7	2.0	1.9
								31	1.7	.....	1.9

SKILLET FORK NEAR WAYNE CITY, ILL.

This station is located at the Southern Railway bridge, 1 mile east of Wayne City, Ill. It was established August 16, 1908, to obtain data for use in studying drainage and flood-control problems. The drainage area above the section is about 457 square miles.

The gage datum has remained unchanged and the records are reliable and accurate.

The following measurement was made below the regular section July 18, 1908:

Width, 19.5 feet; area, 36 square feet; gage height, 2.2 feet; discharge, 1 second-foot.

Daily gage height, in feet, of Skillet Fork near Wayne City, Ill., for 1908.

[Observer, Evert Higdon.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.0	1.7	2.0	2.3	16	2.2	1.8	1.6	1.7	2.0
2	.....	2.0	1.6	1.9	2.4	17	2.2	1.8	1.7	1.6	1.8
3	.....	2.0	1.6	1.8	2.2	18	2.2	1.8	1.8	1.8	2.1
4	.....	2.0	1.7	1.6	2.1	19	2.2	1.8	1.9	1.9	2.0
5	.....	2.0	1.9	1.9	2.1	20	2.2	1.7	1.8	1.7	1.9
6	.....	2.0	1.7	1.7	2.2	21	2.2	1.7	1.6	1.8	2.0
7	.....	2.0	1.9	1.8	2.3	22	2.2	1.6	1.7	1.8	2.1
8	.....	2.0	1.8	1.9	2.4	23	2.2	1.6	1.9	1.7	2.2
9	.....	2.0	1.6	2.0	1.9	24	2.2	1.6	1.8	1.9	2.0
10	.....	2.0	1.7	1.8	1.8	25	2.2	1.7	1.6	2.0	1.9
11	.....	1.9	1.8	1.7	1.7	26	2.2	1.7	1.5	1.8	2.0
12	.....	1.9	1.9	1.9	1.9	27	2.1	1.6	1.7	1.6	2.0
13	.....	1.9	1.8	2.0	2.1	28	2.1	1.9	1.8	1.7	2.0
14	.....	1.9	1.8	1.9	1.9	29	2.0	1.8	1.6	2.7	1.8
15	.....	1.8	1.7	1.8	1.8	30	2.0	1.8	1.7	2.5	2.0
						31	2.0	.....	1.8	.....	2.1

SKILLET FORK NEAR MILL SHOALS, ILL.

This station is located at the Baltimore and Ohio Southwestern Railroad bridge, 1 mile south of Mill Shoals, Ill. It was established October 9, 1908, for the purpose of obtaining data for use in studying drainage and flood control problems.

Haw Creek enters from the west about 3 miles above the station. The drainage area above the section is about 863 square miles.

The datum of the gage has not been changed. The records are reliable and accurate. No discharge measurements were made at this station during 1908.

Daily gage height, in feet, of Skillet Fork near Mill Shoals, Ill., for 1908.

[Observer, J. A. Clow.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	1.5	1.6	11	.....	1.5	1.6	21	1.5	1.5	1.6
2	.....	1.5	1.6	12	1.5	1.5	1.6	22	1.5	1.5	1.6
3	.....	1.5	1.6	13	1.5	1.5	1.6	23	1.5	1.5	1.6
4	.....	1.5	1.6	14	1.5	1.5	1.6	24	1.5	1.5	1.6
5	.....	1.5	1.6	15	1.5	1.5	1.6	25	1.5	1.5	1.6
6	.....	1.5	1.6	16	1.5	1.5	1.6	26	1.5	1.9	1.6
7	.....	1.5	1.6	17	1.5	1.5	1.6	27	1.5	1.6	1.6
8	.....	1.5	1.6	18	1.5	1.5	1.6	28	1.5	1.6	1.6
9	.....	1.5	1.6	19	1.5	1.5	1.6	29	1.5	1.6	1.6
10	.....	1.5	1.6	20	1.5	1.5	1.6	30	1.5	1.6	1.6
								31	1.5	.....	1.6

TENNESSEE RIVER BASIN.

DESCRIPTION OF BASIN.[a]

Tennessee River gathers its waters from seven States—Virginia, North Carolina, Georgia, Tennessee, Alabama, Mississippi, and Kentucky. The total area drained by it is about 39,000 square miles. Its extreme range discharge to the present time has been estimated at about 650,000 second-feet for flood stages and about 8,000 second-feet for low stages.

The exact point at which Tennessee River has its origin was long a matter of uncertainty. Rivière des Cheraquis, or Cherake, of the early French explorers, and Cherokee River as referred to in cessions to the English by the Indians in 1767, has been considered as being formed by the junction of what are now called Little Tennessee and Holston rivers, near the town of Lenoirs, Tenn. Tannassee, the chief town of the Cherokee Indians, was situated near this point, and the fact that the river derives its present name from that town seems to add additional weight to the arguments of the geographers who have placed the headwaters of the river at this junction. In some of the older geographies the head of this river has been placed at the mouth of Clinch River.

The legislature of the State of Tennessee in 1889 passed an act declaring "that the Tennessee extends from its junction with the Ohio River at Paducah, in the State of Kentucky, past the Clinch and French Broad rivers, to the junction of the north fork of the Holston River, with the Holston, at Kingsport, in Sullivan County, Tenn., all usages to the contrary notwithstanding."

Congressional legislation, however, in several laws appropriating money for the improvement of the upper Tennessee, between Knoxville and Chattanooga, has given authority for extending the name at least to the former city, but as the junction of Holston and French Broad rivers is but 4½ miles above Knoxville, this point is now generally taken as the head of Tennessee River, and in the river and harbor act of 1890 this point appears to have been definitely fixed by the specific language of the act providing for a survey of Tennessee River, from Chattanooga to the junction of Holston and French Broad rivers.

The Holston rises in the Allegheny Mountains, at an elevation of 2,500 feet above sea level. It is a rapid stream, about 400 feet in width, and flows through a narrow valley over a rocky bed. The French Broad heads in the Blue Ridge and winds through a broader and more fertile valley than that of the Holston. The French Broad, because of its greater drainage area, is here considered the main stream.

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[a] Description abstracted from Report Chief of Engineers, United States Army, 1893, pt. 3, p. 2330; 1897, pt. 3, pp. 2247, 2249, 2250.

Below the junction of its headwater streams, the Tennessee flows southwestward, crossing into Alabama about 40 miles below Chattanooga, Tenn., and after crossing the northern part of Alabama again enters Tennessee in Harding County. It then flows northward, crossing Tennessee and Kentucky, and enters Ohio River at Paducah, about 40 miles above Cairo.

The channel of the bed of the Tennessee, as well as that of most of its tributaries, consists not of a smooth, even furrow like a ditch, but rather of a series of long and narrow and deep holes or troughs, these holes being separated from each other by ridges, which are generally broad and flat on top and of such length as to make the river considerably wider where they occur than it is at the deeper pools. The crest of any one of these ridges is generally a little lower than that of the one which immediately precedes it upstream. These ridges are generally composed of hard material—such as cemented gravel, loose rocks of considerable size, or more often of solid ledges, and are, in short, the bars or reefs—and are the places where in low water navigation is most inconvenient and difficult. They are found at the places where the bottom of the river is harder and offers more resistance to errosion than the banks and where in consequence the river, in its effort to secure a channel sufficiently commodious to carry its flood discharge, has cut away the banks instead of the bottom, naturally selecting the softer material.

In low water, then, the river is made up of a series of narrow ponds or pools, varying from a few hundred yards to several miles in length, in which the water is deep, the current gentle, and navigation generally free and unobstructed, these pools being separated by bars where the river is wide, the water shallow, and the current rapid, where islands frequently occur and divide and subdivide the channel, and where nearly all the fall is concentrated, where snags and bowlders are generally found, and where navigation is in consequence difficult, often dangerous, and sometimes impossible. This is the condition at low water.

When the river rises, the gain in cross section is greater on the wide bars than it is in the narrow pools, and consequently the area of discharge increases more rapidly on the bars than it does in the pools; the area of the cross section of discharges on the bars rapidly approaches that in the pools, and finally equals and then exceeds it. As a result the conditions with respect to the velocity of the current are reversed in high water and the current becomes sluggish, comparatively speaking, where before it was most rapid and swift. For this reason gravel, bowlders, sunken logs, and other débris are scoured from the bottom of the pools at high water and are often deposited on the bars, where they remain when the river falls, the

feebler currents due to the low-water discharge not being adequate to remove them.

The Tennessee has always held an important place in the projects for the improvement of the navigable waterways of the country. The Muscle Shoals Canal having been opened to navigation, the Tennessee is now navigable from its mouth for a distance of 673 miles, during several months of each year, and as work is continued upon other less formidable obstructions the season of navigation will be correspondingly lengthened. The radical improvement of this river, so as to make navigation continuous throughout its length for boats of moderate draft, is by no means an impossibility.

The important tributaries of the Tennessee include Clinch River, which enters near Kingston in Roan County; Hiwassee River, which rises in northern Georgia, enters the main stream from the south about 30 miles above Chattanooga; and Little Tennessee, which rises in the northeast corner of Georgia, flows across the southwestern part of North Carolina, and enters the Tennessee near Loudon, Tenn.

The following gaging stations have been maintained in this river basin:

French Broad River at Rosman, N. C., 1907–8.
French Broad River at Horseshoe, N. C., 1904–1906.
French Broad River near Asheville, N. C., 1895–1908.
French Broad River at Newport, Tenn., 1900–1905, 1907.
Tennessee River at Knoxville, Tenn., 1899–1908.
Tennessee River at Chattanooga, Tenn., 1895–1908.
Davidson River near Davidson River, N. C., 1904–1908.
Little River at Calhoun, N. C., 1907–8.
North Fork Mills River at Pinkbed, N. C., 1904–1908.
South Fork Mills River near Sitton, N. C., 1904–1908.
Mud Creek at Naples, N. C., 1907.
Swannanoa River at Swannanoa, N. C., 1907–8.
Swannanoa River at Biltmore, N. C., 1905.
Ivy River at Democrat, N. C., 1907.
Pigeon River at Canton, N. C., 1907–8.
Pigeon River at Newport, Tenn., 1900–1908.
Nolichucky River at Chucky Valley, Tenn., 1900–1901.
Nolichucky River near Greeneville, Tenn., 1903–1908.
North Toe River at Spruce Pine, N. C., 1907–8.
South Fork, Holston River, near Chilhowie, Va., 1907–8.
South Fork, Holston River, at Bluff City, Tenn., 1900–1908.
Holston River near Rogersville, Tenn., 1904–1908.
Middle Fork, Holston River, at Chilhowie, Va., 1907–8.
Roan Creek at Butler, Tenn., 1900–1901.
Watauga River at Butler, Tenn., 1900–1901.
Watauga River near Elizabethton, Tenn., 1903–1908.
Elk Creek at Lineback, Tenn., 1900–1901.
Doe River at Elizabethton, Tenn., 1907–8.
North Fork, Holston River, at Saltville, Va., 1907–8.
Little Tennessee River near Franklin, N. C., 1907–8.

Little Tennessee River at Judson, N. C., 1896–1908.
Little Tennessee River at McGhee, Tenn., 1905–1908.
Cullasaja River at Cullasaja, N. C., 1907–8.
Nantahala River near Nantahala, N. C., 1907–8.
Tuckaseegee River near East Laport, N. C., 1907–8.
Tuckaseegee River at Bryson, N. C., 1896–1908.
Scotts Creek near Dillsboro, N. C., 1907–8.
Oconolufty River near Cherokee, N. C., 1907–8.
Cheoah River at Millsaps, N. C., 1907–8.
Clinch River at Clinchport, Va., 1907–8.
Hiwassee River near Hayesville, N. C., 1907–8.
Hiwassee River at Murphy, N. C., 1896–1908.
Hiwassee River at Reliance, Tenn., 1900–1908.
Hiwassee River at Charlestown, Tenn., 1899–1901, 1903.
Tusquite Creek near Hayesville, N. C., 1907–8.
Valley River at Tomotla, N. C., 1904–1908.
Nottely River at Ranger, N. C., 1901–1905.
Toccoa River near Dial, Ga., 1907–8.
Toccoa River at Blueridge, Ga., 1899–1903.
Ocoee River at McCays, Tenn., 1903–1908.
Elk River near Elkmont, Ala., 1904–1908.
Duck River at Columbia, Tenn., 1904–1908.

FRENCH BROAD RIVER AT ROSMAN, N. C.

This station is located at a wagon bridge about 800 feet east of the railroad station at Rosman. It was originally established May 7, 1907, in cooperation with the Forest Service for the purpose of obtaining data for use in determining the water resources and water-power possibilities in the southern Appalachian Mountains and relating to the flow of the larger streams below. It is about one-half mile above the mouth of East Fork of the river, and the same distance below the junction of North and West forks.

Discharge measurements are made from a wooden truss bridge where the current is good and the conditions are favorable for a constant rating.[a]

Discharge measurements of French Broad River at Rosman, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 7	Warren E. Hall	71	297	2.31	235
July 16	do	67	258	2.00	132
September 23	do	70	337	2.90	538
Do	do	70	340	2.83	474
Do	do	70	331	2.78	440
December 16	do	63	259	2.50	289
1908.					
July 18	F. P. Thomas	61	251	2.10	163

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of French Broad River at Rosman, N. C., for 1907 and 1908.

[Observer, L. M. Glazener.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.2	1.9	1.9	1.9	2.1	1.9	2.1
2	.....	.....	.....	.....	.....	2.4	1.9	1.9	1.9	2.1	2.6	2.1
3	.....	.....	.....	.....	.....	2.2	1.9	1.9	1.9	2.0	2.3	2.0
4	.....	.....	.....	.....	.....	2.1	1.9	1.9	1.9	2.0	2.2	2.0
5	.....	.....	.....	.....	.....	2.1	1.9	1.8	1.9	2.0	2.0	2.0
6	.....	.....	.....	.....	.....	2.1	1.9	1.9	1.9	2.0	2.0	2.0
7	.....	.....	.....	.....	2.3	2.0	1.9	1.8	1.8	2.0	1.9	2.0
8	.....	.....	.....	.....	2.2	2.2	1.9	1.8	1.9	2.1	1.9	2.0
9	.....	.....	.....	.....	2.2	2.1	1.9	1.8	1.9	2.0	1.9	2.6
10	.....	.....	.....	.....	2.1	2.1	1.9	1.8	1.9	1.9	2.3	3.3
11	.....	.....	.....	.....	2.3	2.0	2.0	2.0	1.9	1.9	2.0	2.8
12	.....	.....	.....	.....	2.1	2.0	2.0	1.9	1.9	1.9	2.0	2.6
13	.....	.....	.....	.....	2.1	2.1	2.0	1.9	1.8	1.9	1.9	2.4
14	.....	.....	.....	.....	2.1	2.1	2.0	1.9	1.8	1.9	1.9	3.4
15	.....	.....	.....	.....	2.2	2.0	2.0	2.0	1.8	1.9	1.9	2.8
16	.....	.....	.....	.....	2.1	2.0	2.2	2.0	1.8	1.9	1.9	2.5
17	.....	.....	.....	.....	2.1	2.0	2.0	1.9	1.8	1.9	1.9	2.2
18	.....	.....	.....	.....	2.1	2.0	2.0	2.0	1.8	1.9	2.8	2.2
19	.....	.....	.....	.....	2.1	2.0	2.0	2.0	1.8	1.9	2.2	2.2
20	.....	.....	.....	.....	2.1	2.0	2.0	2.0	1.8	1.9	2.2	2.2
21	.....	.....	.....	.....	2.0	2.0	1.9	1.9	1.8	1.9	3.6	2.1
22	.....	.....	.....	.....	2.0	2.0	1.9	2.1	2.0	1.9	2.1	1.9
23	.....	.....	.....	.....	2.0	2.0	1.9	2.1	4.2	1.9	2.7	4.2
24	.....	.....	.....	.....	2.0	2.0	1.9	2.1	2.2	1.9	3.1	3.0
25	.....	.....	.....	.....	2.0	2.0	1.9	2.0	2.1	1.8	2.5	2.8
26	.....	.....	.....	.....	2.3	2.0	1.9	1.9	2.0	1.8	2.4	2.5
27	.....	.....	.....	.....	2.1	2.0	1.9	1.9	2.0	1.9	2.3	2.5
28	.....	.....	.....	.....	2.0	2.0	2.5	1.9	2.2	1.9	2.3	2.2
29	.....	.....	.....	.....	2.0	2.0	2.0	1.9	2.4	1.9	2.2	2.2
30	.....	.....	.....	.....	2.0	2.0	2.0	1.9	2.2	1.9	2.1	3.9
31	.....	.....	.....	.....	2.25	.....	1.9	1.9	.....	1.9	.....	2.5
1908.												
1	2.8	2.8	2.7	2.5	2.9	2.3	2.2	2.1	2.4	2.0	2.6	2.2
2	2.6	2.6	2.7	2.4	2.8	2.3	2.3	2.0	2.4	2.0	2.4	2.5
3	2.4	2.5	2.8	2.2	2.7	2.4	2.4	2.0	2.3	2.0	2.2	2.4
4	2.0	2.5	2.8	2.0	2.7	2.7	2.9	2.0	2.3	2.0	2.2	2.3
5	2.6	2.2	2.8	2.5	2.7	2.7	3.0	2.6	2.9	2.0	2.2	2.1
6	2.6	2.2	2.6	2.5	2.7	2.7	2.8	2.4	2.6	1.9	2.2	2.1
7	2.6	2.4	2.6	2.5	3.3	2.4	2.7	2.4	2.6	2.0	2.3	4.1
8	2.6	2.4	2.5	2.5	2.9	2.4	2.5	2.4	2.4	2.2	2.0	3.9
9	2.4	2.3	2.4	2.4	2.8	2.4	2.3	2.1	2.4	2.6	2.0	2.8
10	2.4	2.3	2.4	2.4	2.6	2.4	2.3	2.1	2.2	2.9	2.0	2.5
11	2.4	2.6	2.4	2.4	2.6	2.4	2.3	2.1	2.2	2.3	2.2	2.4
12	3.9	2.9	2.8	2.2	2.6	2.4	2.3	2.1	2.1	2.2	2.3	2.4
13	3.0	3.0	2.7	2.2	2.6	2.4	2.2	2.0	2.0	2.0	2.4	2.1
14	2.9	3.3	2.7	2.5	2.6	2.4	2.2	2.0	2.0	2.0	2.5	2.1
15	2.9	7.3	2.6	3.3	2.6	2.7	2.2	2.0	2.0	2.0	2.2	2.1
16	2.8	3.9	2.4	2.9	2.7	2.4	2.2	2.0	2.0	2.0	2.1	2.1
17	2.6	3.5	2.4	2.9	2.7	2.4	2.2	2.0	2.0	2.0	2.1	2.1
18	2.6	3.0	2.4	2.7	2.7	2.4	2.2	2.0	2.0	2.0	2.1	2.1
19	2.8	3.0	2.6	2.6	2.8	2.4	2.1	2.0	2.0	2.0	2.1	2.1
20	2.5	2.9	2.9	2.6	2.6	2.4	2.1	2.3	2.0	2.0	2.1	2.1
21	2.5	2.7	2.9	2.5	2.6	2.3	2.1	2.7	2.0	2.0	2.1	2.1
22	2.5	2.7	2.7	2.5	2.6	2.3	2.1	3.0	2.0	2.2	2.0	2.9
23	2.5	2.7	3.0	2.5	2.6	2.3	2.1	2.7	2.0	2.9	2.0	2.7
24	2.4	2.6	3.4	2.4	2.6	2.3	2.1	3.5	2.0	2.8	2.0	2.6
25	2.0	2.9	2.9	4.7	2.6	2.3	2.3	3.8	2.0	2.4	2.0	2.6
26	2.8	3.0	2.7	3.4	2.8	2.3	2.2	3.0	1.9	2.2	2.0	2.4
27	2.8	2.9	2.7	2.9	2.5	2.3	2.2	2.9	2.1	2.9	2.0	2.4
28	2.4	2.8	2.6	2.7	2.5	2.3	2.2	2.8	2.2	4.4	2.0	2.2
29	2.4	2.7	2.5	2.7	2.5	2.3	2.1	2.5	2.0	3.6	2.1	2.2
30	2.4	.....	2.6	2.9	2.5	2.3	2.1	2.4	2.0	3.0	2.1	2.2
31	2.6	.....	2.8	.....	2.3	.....	2.1	2.4	.....	2.9	.....	2.2

Daily discharge, in second-feet, of French Broad River at Rosman, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	110	110	110	160	110	160
2	.....	.....	.....	.....	.....	260	110	110	110	160	345	160
3	.....	.....	.....	.....	.....	190	110	110	110	133	223	133
4	.....	.....	.....	.....	.....	160	110	110	110	133	190	133
5	.....	.....	.....	.....	.....	160	110	90	110	133	133	133
6	.....	.....	.....	.....	.....	160	110	110	110	133	133	133
7	.....	.....	.....	.....	223	133	110	90	90	133	110	133
8	.....	.....	.....	.....	190	190	110	90	110	160	110	133
9	.....	.....	.....	.....	190	160	110	90	110	133	110	345
10	.....	.....	.....	.....	160	160	110	90	110	110	223	.....
11	.....	.....	.....	.....	223	133	133	133	110	110	133	450
12	.....	.....	.....	.....	160	133	133	110	110	110	133	345
13	.....	.....	.....	.....	160	160	133	110	90	110	110	260
14	.....	.....	.....	.....	160	160	133	110	90	110	110	.....
15	.....	.....	.....	.....	190	133	133	133	90	110	110	450
16	.....	.....	.....	.....	160	133	190	133	90	110	110	300
17	.....	.....	.....	.....	160	133	133	110	90	110	110	190
18	.....	.....	.....	.....	160	133	133	133	90	110	450	190
19	.....	.....	.....	.....	160	133	133	133	90	110	190	190
20	.....	.....	.....	.....	160	133	133	133	90	110	190	190
21	.....	.....	.....	.....	133	133	110	110	90	110	.....	160
22	.....	.....	.....	.....	133	133	110	160	133	110	160	110
23	.....	.....	.....	.....	133	133	110	160	.....	110	395	.....
24	.....	.....	.....	.....	133	133	110	160	190	110	.....	570
25	.....	.....	.....	.....	133	133	110	133	160	90	300	450
26	.....	.....	.....	.....	223	133	110	110	133	90	260	300
27	.....	.....	.....	.....	160	133	110	110	133	110	223	300
28	.....	.....	.....	.....	133	133	300	110	190	110	223	190
29	.....	.....	.....	.....	133	133	133	110	260	110	190	190
30	.....	.....	.....	.....	133	133	133	110	190	110	160	.....
31	.....	.....	.....	.....	206	.....	110	110	.....	110	.....	300
1908.												
1	450	450	395	300	510	223	190	160	260	133	345	190
2	345	345	395	260	450	223	223	133	260	133	260	300
3	260	300	450	190	395	260	260	133	223	133	190	260
4	133	300	450	133	395	395	510	133	223	133	190	223
5	345	190	450	300	395	395	570	345	510	133	190	160
6	345	190	345	300	395	395	450	260	345	110	190	160
7	345	260	345	300	.....	260	395	260	345	133	223	.....
8	345	260	300	300	510	260	300	260	260	190	133	.....
9	260	223	260	260	450	260	223	160	260	345	133	450
10	260	223	260	260	345	260	223	160	190	510	133	300
11	260	345	260	260	345	260	223	160	190	223	190	260
12	.....	510	450	190	345	260	223	160	160	190	223	260
13	570	570	395	190	345	260	190	133	133	133	260	160
14	510	.....	395	300	345	260	190	133	133	133	300	160
15	510	.....	345	.....	345	395	190	133	133	133	190	160
16	450	.....	260	510	395	260	190	133	133	133	160	160
17	345	.....	260	510	395	260	190	133	133	133	160	160
18	345	570	260	395	395	260	190	133	133	133	160	160
19	450	570	345	345	450	260	160	133	133	133	160	160
20	300	510	510	345	345	260	160	223	133	133	160	160
21	300	395	510	300	345	223	160	395	133	133	160	160
22	300	395	395	300	345	223	160	570	133	190	133	510
23	300	395	570	300	345	223	160	395	133	510	133	395
24	260	345	.....	260	345	223	160	.....	133	450	133	345
25	133	510	510	.....	345	223	223	.....	133	260	133	345
26	450	570	395	.....	450	223	190	570	110	190	133	260
27	450	510	395	510	300	223	190	510	160	510	133	260
28	260	450	345	395	300	223	190	450	190	.....	133	190
29	260	395	300	395	300	223	160	300	133	.....	160	190
30	260	.....	345	510	300	223	160	260	133	570	160	190
31	345	.....	450	.....	223	.....	160	260	.....	510	.....	190

NOTE.—Daily discharges 1907 and 1908 are based on a well defined rating curve. The discharge was greater than 600 second-feet for all missing days beginning May 7, 1907.

FRENCH BROAD RIVER NEAR ASHEVILLE, N. C.

This station is located at the steel highway bridge known as Smith Bridge, about 1 mile below the Southern Railway depot at Asheville, and near the end of the Patton Avenue line of the Asheville Street Railway Company. It is about 2 miles below the mouth of Swannanoa River.

The United States Weather Bureau maintains a station at this place, and during 1904 a number of discharge measurements were made by the United States Geological Survey. Since the beginning of 1905 the discharge measurements have been continued and the gage heights have been furnished by the United States Weather Bureau.

Besides the general value of the data for stream-flow studies, they are especially valuable for water-power estimates, there being a great amount of fall in the river below.

The conditions of flow are favorable for accurate discharge measurements and for a constant rating curve, except that the rating was somewhat changed by bridge piers erected during 1907. The datum of the gage has not been changed.[a]

Discharge measurements of French Broad River near Asheville, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 2	Warren E. Hall	317	970	0.04	1,550
May 25	do	321	993	.06	1,610
December 12	do	316	1,050	.58	1,910
1908.					
April 13	Warren E. Hall	320	1,000	0.28	1,690
July 20	F. P. Thomas	312	851	−.04	1,160

Daily gage height, in feet, of French Broad River near Asheville, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.8	0.2	0.0	0.5	3.2	0.6	−0.2	−0.3	−0.6	−0.2	−0.7	0.0
2	1.8	.4	.4	.3	.1	1.4	−.3	−.3	−.6	−.4	−.7	−.1
3	1.4	.4	1.0	.1	.8	.8	−.1	−.4	−.6	−.4	.3	−.1
4	1.1	.4	.5	−.1	1.0	1.4	−.1	−.5	−.5	−.4	−.3	−.2
5	1.0	1.0	.2	−.2	.8	.2	−.2	−.6	−.4	−.4	−.6	−.2
6	.8	.7	.1	.0	.5	.1	−.3	−.6	−.4	−.4	−.6	−.3
7	.7	.4	.1	.7	.6	.0	−.3	−.6	−.6	−.4	−.6	−.3
8	.5	.3	.2	.4	.6	.1	−.4	−.5	−.6	−.5	−.6	−.3
9	.5	.1	.1	.3	.5	.3	−.4	−.5	−.6	−.3	−.6	−.2
10	.5	.1	.1	.2	.4	.9	−.4	−.6	−.6	−.4	−.5	.7
11	.5	.1	.4	.1	.4	.3	−.2	−.5	−.5	−.5	−.5	2.0
12	.4	.1	.3	.1	.4	.1	.0	−.3	−.5	−.5	−.5	.7
13	.4	.1	.2	.0	.3	−.1	−.1	−.2	−.5	−.6	−.5	.2
14	.4	.1	.1	.0	.2	.1	−.3	−.3	−.6	−.6	−.5	2.5
15	.4	.1	.3	−.1	.1	−.1	−.4	−.3	−.6	−.6	−.6	3.2

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of French Broad River near Asheville, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	0.3	0.1	0.3	−0.1	0.1	−0.2	−0.0	−0.4	−0.7	−0.6	−0.6	2.8
17	.3	.1	.2	−.1	.1	−.3	.0	−.2	−.6	−.6	−.6	1.0
18	.3	.0	.1	−.2	.1	−.3	.0	−.2	−.6	−.6	−.6	.7
19	.3	.0	.1	.1	.0	−.3	−.2	−.3	−.6	−.6	.1	.6
20	.2	−.1	.1	.1	−.1	−.3	−.2	−.3	−.7	−.6	.0	.5
21	.3	−.1	.0	−.1	−.2	−.1	−.3	−.4	−.6	−.6	.2	.3
22	.3	−.1	.0	2.0	−.2	.1	−.3	.0	−.6	−.6	1.7	.2
23	.2	−.1	.0	1.0	−.2	−.1	−.4	.1	1.4	−.7	1.5	3.0
24	.1	−.1	−.1	.9	−.2	.1	−.4	−.1	2.0	−.7	2.9	3.5
25	.1	.0	−.1	.4	−.2	.1	−.4	−.2	.3	−.7	2.5	2.0
26	.1	.1	−.2	.2	.7	.2	−.2	−.3	−.2	−.7	1.1	1.3
27	.2	.2	.1	1.6	.8	−.1	−.3	−.4	−.4	−.7	.8	1.0
28	.1	.1	.0	.6	.2	.3	−.4	−.5	−.3	−.6	.4	.7
29	.1	.....	−.1	.4	.0	.3	−.3	−.6	.4	−.7	.0	.6
30	.1	.....	−.2	.3	−.2	.1	.1	−.6	.1	−.7	.0	.8
31	.1	.....	.2	.....	.2	.....	−.2	−.6	.....	−.7	.....	2.7
1908.												
1	1.7	.3	1.2	.8	1.0	.2	−.3	.1	.3	−.1	1.7	.0
2	1.2	.3	1.1	.8	.8	.1	−.3	−.2	.2	−.2	1.1	.0
3	1.0	.3	1.1	.6	.8	.0	.4	−.2	.2	−.3	.8	.2
4	.8	.4	1.1	.5	.7	.1	.5	.2	.1	−.3	.6	.0
5	1.5	.4	1.0	.5	.5	.0	1.5	.0	.1	−.3	.4	.0
6	1.2	.5	1.0	.5	.4	.4	1.9	.4	2.7	−.3	.3	.0
7	1.0	.7	.9	.5	1.2	.2	1.3	.8	1.3	−.3	.2	1.1
8	1.3	.7	.8	.6	1.7	.1	1.3	.7	.4	−.4	.2	2.5
9	.9	.6	.8	.5	1.0	.0	1.0	.8	.4	−.3	.1	1.5
10	.7	.6	.7	.4	.8	.3	1.0	.5	.4	2.5	.1	1.0
11	.5	.7	.6	.4	.6	.3	.8	.2	.3	.9	.1	.7
12	5.9	1.8	.9	.3	.5	.1	.3	.0	.2	.7	.3	.8
13	4.5	1.9	.9	.3	.5	.1	.1	.0	.2	.0	.2	.6
14	3.5	2.1	.8	.2	.4	.3	.2	−.1	.2	.0	.4	.4
15	2.0	5.9	.7	.2	.3	.3	.1	−.1	.1	−.1	.7	.3
16	1.5	5.4	.6	1.8	.3	.3	.5	−.1	.0	−.1	.4	.2
17	1.2	4.8	.5	1.2	.6	.0	.2	.3	.0	−.2	.3	.1
18	1.0	3.8	.4	.9	.9	.0	.1	.0	.0	−.3	.2	.1
19	1.0	2.3	.4	.8	1.2	.0	.1	−.1	.0	−.3	.1	.1
20	.9	2.4	.5	.8	.9	.0	.0	−.1	−.1	−.3	.0	.1
21	.7	1.8	1.9	.6	.6	−.1	−.2	−.1	−.2	−.3	.0	.1
22	.5	1.7	1.4	.5	.4	.1	−.2	1.1	−.2	−.3	.0	.3
23	.5	1.4	1.1	.4	.4	.0	.3	1.1	−.2	1.2	.0	2.2
24	.5	1.3	3.0	.4	.5	.0	.2	1.8	−.2	3.4	.0	1.7
25	.4	1.2	2.9	1.1	.4	.0	.0	3.2	−.2	1.7	.0	1.2
26	.4	1.4	1.8	2.9	.4	−.1	.2	4.9	−.2	1.1	.0	.8
27	.6	1.8	1.4	1.7	.5	−.1	−.1	4.2	−.2	.8	.0	.8
28	.6	1.4	1.1	1.4	.4	−.2	.3	3.0	.1	.6	−.1	.6
29	.4	1.2	1.0	1.1	.4	−.2	.4	1.3	.2	2.6	−.1	.4
30	.3	.....	.9	.9	.5	−.2	.7	1.0	.0	3.6	−.1	.4
31	.3	.....	.8	.....	.3	.....	.4	.8	.....	2.1	.....	.8

Rating tables for French Broad River near Asheville, N. C.

FOR 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
−1.10	340	−0.10	1,380	0.90	2,890	1.90	4,960
−1.00	420	.00	1,510	1.00	3,070	2.00	5,200
−.90	500	.10	1,650	1.10	3,250	2.20	5,700
−.80	590	.20	1,790	1.20	3,440	2.40	6,230
−.70	690	.30	1,930	1.30	3,640	2.60	6,770
−.60	790	.40	2,080	1.40	3,850	2.80	7,320
−.50	900	.50	2,230	1.50	4,060	3.00	7,890
−.40	1,010	.60	2,390	1.60	4,270	3.20	8,480
−.30	1,130	.70	2,550	1.70	4,490	3.40	9,080
−.20	1,250	.80	2,720	1.80	4,720		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on four discharge measurements made during 1906 and 1907, and is well defined. See also monthly discharge table footnote.

Rating tables for French Broad River near Asheville, N. C.—Continued.

FOR 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
−0.40	790	0.90	2,560	2.20	4,980	4.00	9,700
− .30	900	1.00	2,720	2.30	5,210	4.20	10,300
− .20	1,020	1.10	2,880	2.40	5,440	4.40	10,910
− .10	1,140	1.20	3,050	2.50	5,680	4.60	11,530
.00	1,260	1.30	3,220	2.60	5,920	4.80	12,160
.10	1,390	1.40	3,390	2.70	6,170	5.00	12,800
.20	1,530	1.50	3,570	2.80	6,420	5.20	13,460
.30	1,670	1.60	3,750	2.90	6,670	5.40	14,120
.40	1,810	1.70	3,940	3.00	6,930	5.60	14,800
.50	1,950	1.80	4,140	3.20	7,460	5.80	15,500
.60	2,100	1.90	4,340	3.40	8,000	6.00	16,200
.70	2,250	2.00	4,550	3.60	8,560		
.80	2,400	2.10	4,760	3.80	9,120		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on two discharge measurements made during 1908 and the general form of the previous curves, and is fairly well defined.

Monthly discharge of French Broad River near Asheville, N. C., for 1907 and 1908.

[Drainage area, 987 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	7,320	1,650	2,360	2.39	2.76	B.
February	3,070	1,380	1,750	1.77	1.84	B.
March	3,070	1,250	1,720	1.74	2.01	B.
April	5,200	1,250	2,010	2.04	2.28	B.
May	8,480	1,250	2,100	2.13	2.46	B.
June	3,850	1,130	1,810	1.83	2.04	B.
July	1,510	900	1,100	1.11	1.28	C.
August	1,320	545	775	.785	.90	C.
September	4,380	380	837	.848	.95	C.
October	900	420	553	.560	.65	D.
November	6,900	460	1,490	1.51	1.68	C.
December	8,630	845	2,900	2.94	3.39	B.
The year	8,630	380	1,620	1.64	22.24	
1908.						
January	15,800	1,670	3,450	3.50	4.04	B.
February	15,800	1,670	4,430	4.49	4.84	B.
March	6,930	1,810	2,920	2.96	3.41	B.
April	6,670	1,530	2,440	2.47	2.76	B.
May	3,940	1,670	2,180	2.21	2.55	B.
June	1,810	1,020	1,350	1.37	1.53	B.
July	4,340	900	1,870	1.89	2.18	B.
August	12,500	1,020	2,780	2.82	3.25	B.
September	6,170	1,020	1,580	1.60	1.78	B.
October	8,560	790	2,280	2.31	2.66	B.
November	3,940	1,140	1,640	1.66	1.85	B.
December	5,680	1,260	2,190	2.22	2.56	B.
The year	15,800	790	2,430	2.46	33.41	

NOTE.—During the last half of 1907 construction work on a bridge immediately below the station caused more or less backwater. The stage of construction and hence amount of obstruction was known from month to month and in addition one measurement was made while construction was going on and two have been made since the bridge was completed. From these data it was possible to estimate fairly well the amount of backwater effect and make the necessary corrections in gage heights. Before application of the 1907 rating table to the gage heights July to December, 1907, the following corrections were made to daily gage heights: July, −0.1 foot; August, −0.25 foot; September, −0.35 foot; October, −0.3 foot; November and December, −0.25 foot.

FRENCH BROAD RIVER NEAR NEWPORT, TENN.[a]

This station is located at the highway bridge about 2 miles north of Newport. It was originally established September 4, 1900, and was maintained for a portion of the time only during 1900 and 1901. The bridge was washed away in the spring of 1902, carrying with it the gage and all reference points. A new bridge having been built, the station was re-established October 27, 1902, and was maintained until the end of 1905, when it was discontinued.

In connection with the Appalachian Forest investigation the gage readings were again maintained from August 16 to December 31, 1907. Since October 27, 1902, the gage datum has remained the same.

Daily gage height, in feet, of French Broad River near Newport, Tenn., for 1907.

[Observer, T. B. Odell.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.1	1.5	1.2	1.6	16	1.4	1.1	1.2	1.3	2.9
2	.....	1.0	1.4	1.3	1.6	17	1.4	1.2	1.1	1.2	2.3
3	.....	1.1	1.3	1.2	1.6	18	1.5	1.2	1.1	1.3	2.1
4	.....	1.0	1.3	1.6	1.5	19	1.4	1.1	1.1	1.5	2.0
5	.....	1.2	1.5	1.3	1.5	20	1.4	1.1	1.0	1.7	1.9
6	.....	1.1	1.4	1.3	1.4	21	1.3	.9	1.2	1.9	1.8
7	.....	1.1	1.4	1.3	1.4	22	1.5	1.7	1.1	2.3	1.8
8	.....	1.1	1.3	1.3	1.5	23	1.6	4.7	1.3	2.9	1.8
9	.....	1.1	1.4	1.4	1.6	24	1.7	3.2	1.3	3.6	3.4
10	.....	1.2	1.4	1.9	1.7	25	1.5	2.3	1.2	3.3	3.3
11	.....	1.4	1.3	1.7	2.8	26	1.5	1.7	1.2	2.0	2.4
12	.....	1.3	1.2	1.8	2.3	27	1.5	1.5	1.2	1.8	2.3
13	.....	1.3	1.2	1.5	2.0	28	1.4	1.6	1.2	1.7	2.1
14	.....	1.0	1.1	1.5	1.8	29	1.3	1.6	1.3	1.7	2.0
15	.....	1.0	1.0	1.3	3.4	30	1.4	1.8	1.2	1.7	2.8
						31	1.5	.....	1.3	.....	3.6

Rating table for French Broad River near Newport, Tenn., for 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	500	1.80	2,290	2.70	4,950	3.60	8,420
1.00	640	1.90	2,550	1.80	5,290	3.70	8,840
1.10	790	2.00	2,820	2.90	5.640	3.80	9,270
1.20	960	2.10	3,100	3.00	6,010	3.80	9,700
1.30	1,150	2.20	3,390	3.10	6,390	4.00	10,140
1.40	1,350	2.30	3,690	3.20	6,780	4.20	11,050
1.50	1,570	2.40	3,990	3.30	7,180	4.40	11,980
1.60	1,800	2.50	4,300	3.40	7,590	4.60	12,920
1.70	2,040	2.60	4,620	3.50	8,000	4.80	13,860

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on three discharge measurements made during 1905 and 1906 and is fairly well defined.

[a] Formerly the Oldtown gaging station.

Monthly discharge of French Broad River near Newport, Tenn., for 1907.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 16–31	2,040	1,150	1,480	0.851	0.51	B.
September	13,400	500	1,770	1.02	1.14	B.
October	1,570	640	1,060	.609	.70	B.
November	8,420	960	2,250	1.29	1.44	B.
December	8,420	1,350	3,390	1.95	2.25	B.

TENNESSEE RIVER AT KNOXVILLE, TENN.

This station is located at the Gay street or county highway bridge in the city of Knoxville. It is about 4 miles below the junction of French Broad and Holston rivers.

Daily records are kept by the United States Weather Bureau and are furnished to the Geological Survey, and since 1899 discharge measurements have been made by the Geological Survey. The gage heights for 1899 are from a gage different in location and datum from the present gage. For 1900 to 1908, inclusive, the same gage has been used.

The data are of use principally in connection with other station data in making general run-off studies.

The conditions are not favorable for a high degree of accuracy in discharge measurements, owing to the roughness of the bed and the great height of the bridge from which measurements are made. A number of wing dams for improvement of boat channel make liable changes in the rating curve.

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.9	2.2	4.3	3.7	3.4	1.9	2.9	2.9	1.1	2.3	0.9	2.4
2	7.8	2.9	6.5	3.4	3.1	2.5	2.7	2.2	1.0	2.0	.9	2.3
3	6.5	2.4	8.0	3.2	2.8	5.3	2.2	1.7	1.0	1.7	1.5	2.1
4	5.3	2.2	7.8	2.8	3.7	7.0	2.5	1.4	1.1	1.5	1.9	2.1
5	4.7	3.9	6.0	2.5	4.7	6.8	2.1	1.3	1.2	1.7	1.6	1.9
6	4.3	4.4	4.6	2.8	4.3	4.8	1.9	1.3	1.1	2.2	1.6	1.8
7	4.0	4.5	4.0	4.5	5.5	3.8	1.8	1.2	1.1	2.4	1.4	1.5
8	3.7	3.7	4.0	4.9	6.6	3.8	1.6	1.3	1.3	2.0	1.3	1.4
9	3.5	3.2	4.2	5.3	7.0	9.1	1.6	1.9	1.5	1.6	1.1	1.4
10	3.4	3.0	4.8	5.0	5.4	10.1	1.4	2.3	2.4	1.5	2.3	1.4
11	3.1	2.8	6.2	5.3	4.6	7.7	1.3	3.0	1.8	1.5	3.7	2.3
12	3.0	2.5	7.0	4.5	4.4	6.5	1.4	2.3	2.4	1.3	5.8	4.1
13	2.9	2.4	6.8	3.9	4.1	9.0	4.9	1.7	1.5	1.2	4.8	4.0
14	2.7	2.4	5.7	3.5	3.6	6.3	6.2	1.6	1.8	1.1	2.2	3.0
15	2.7	2.3	5.9	3.4	3.2	11.5	4.9	1.6	1.4	1.0	2.1	3.0
16	2.5	2.2	6.2	3.2	2.9	12.2	4.0	1.4	1.0	1.0	2.0	4.4
17	2.5	2.0	6.0	3.0	2.7	6.2	3.4	1.3	.9	1.0	1.9	4.1
18	2.5	2.0	5.0	3.0	2.6	4.6	3.3	1.3	.9	.9	1.9	3.3
19	2.5	1.9	4.5	3.4	2.4	3.8	2.9	1.7	.9	.9	2.1	2.9
20	2.7	1.8	4.0	4.0	2.3	3.2	3.0	2.4	.9	.9	2.5	2.4

Daily gage height, in feet, of Tennessee River at Knoxville, Tenn., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	3.6	1.8	3.7	4.1	2.0	3.0	2.8	2.1	0.8	0.8	2.6	2.4
22	3.5	1.7	3.4	3.7	2.0	2.8	2.4	1.6	1.1	.8	2.5	2.3
23	3.0	1.8	3.0	3.8	1.9	2.6	1.9	1.9	4.1	.8	2.8	2.2
24	2.7	1.8	2.9	4.5	1.8	2.7	1.7	1.8	9.8	.7	5.3	2.7
25	2.6	2.3	2.7	5.3	1.8	3.3	1.5	2.8	10.5	.7	6.8	5.1
26	2.5	3.7	2.7	4.4	1.8	3.3	1.6	2.5	5.7	.7	6.4	4.5
27	2.4	4.3	2.5	5.2	1.8	2.8	1.8	2.1	3.5	.7	4.7	3.6
28	2.3	4.3	2.5	4.3	2.4	2.5	1.8	1.7	2.7	.7	4.0	3.0
29	2.2	.....	2.3	4.0	2.1	2.9	1.6	1.6	2.4	.8	3.5	3.6
30	2.1	.....	2.2	3.8	1.8	3.5	4.1	1.4	2.3	.8	3.3	6.5
31	2.0	.....	2.2	.....	1.7	.....	3.5	1.3	.....	.9	.....	10.3
1908.												
1	9.9	3.2	3.3	4.1	3.8	3.6	1.1	2.5	2.0	.7	5.3	1.4
2	7.4	3.8	4.1	4.1	3.8	2.7	1.1	1.9	1.7	.7	4.1	1.5
3	5.1	3.8	6.0	8.6	3.6	2.4	1.1	1.3	1.3	.6	3.3	3.0
4	4.1	2.9	6.5	11.9	3.0	2.4	1.6	1.1	1.2	.6	2.4	2.6
5	7.8	2.7	5.6	7.8	2.9	2.7	2.4	1.0	1.2	.6	2.3	2.1
6	8.2	2.9	5.5	5.6	2.7	3.2	2.6	1.4	1.9	.5	2.2	1.8
7	7.4	3.6	7.0	4.7	3.0	4.0	4.2	2.2	3.2	.4	2.0	4.0
8	6.2	3.8	6.3	4.1	4.4	2.9	5.1	3.3	2.6	.4	1.8	10.7
9	5.3	3.8	6.1	4.0	6.0	2.4	5.9	2.9	2.3	.3	1.6	11.1
10	4.2	3.3	5.3	3.8	5.3	2.2	5.1	2.7	1.7	.6	1.4	7.4
11	4.0	3.3	4.5	3.3	4.1	2.0	4.0	2.4	1.4	2.3	1.6	4.2
12	5.5	4.1	6.0	3.6	3.6	2.0	3.0	2.2	1.2	2.6	2.4	4.2
13	16.9	4.4	8.0	2.9	3.2	1.9	2.4	1.6	1.2	2.1	2.3	5.1
14	14.8	7.6	7.4	2.9	2.7	1.9	2.1	1.2	1.0	1.5	2.3	5.0
15	9.7	10.9	6.5	2.7	2.7	1.7	2.0	1.1	.8	1.2	2.2	4.1
16	7.0	15.2	5.6	2.7	2.6	3.3	2.1	1.0	.7	1.0	2.2	3.0
17	6.6	13.7	4.7	4.1	2.4	4.0	1.8	.6	.4	.7	2.2	2.7
18	6.0	9.9	4.5	4.5	2.4	2.6	1.6	.9	.4	.6	2.1	2.4
19	5.1	7.5	4.2	4.1	2.4	2.2	1.6	1.1	.3	.6	2.1	2.2
20	4.7	6.0	5.0	3.6	3.3	2.0	1.5	1.6	.3	.6	1.9	2.1
21	4.1	5.5	6.8	3.2	4.1	1.8	1.3	1.4	.3	.5	1.8	2.0
22	3.6	4.4	8.6	2.9	4.0	1.4	1.2	2.1	.3	.4	1.9	2.6
23	3.6	4.1	7.9	2.7	3.8	1.5	1.1	4.0	.3	.5	1.7	8.3
24	3.6	4.0	7.9	2.6	3.3	1.4	1.1	3.0	.3	1.0	1.7	9.6
25	3.3	3.8	11.0	2.9	2.7	2.7	1.2	2.9	.3	6.8	1.6	6.7
26	3.2	3.8	9.4	8.2	2.7	2.4	1.4	3.9	.3	5.3	1.5	5.0
27	3.0	3.9	7.4	10.8	2.6	2.3	1.1	7.4	.3	3.3	1.4	4.2
28	3.6	4.1	6.1	7.4	2.7	2.2	1.1	6.3	.3	2.3	1.2	4.7
29	3.8	3.8	5.3	5.6	2.4	1.6	1.3	4.0	.5	2.3	1.2	4.5
30	3.3	.....	4.7	4.4	2.7	1.2	2.3	2.9	.6	7.0	1.3	4.5
31	3.0	.....	4.4	.....	3.6	.....	2.0	2.6	.....	6.7	.....	4.5

Rating table for Tennessee River at Knoxville, Tenn., for 1906 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.30	3,220	1.90	8,580	3.50	15,300	6.20	26,660
0.40	3,470	2.00	9,000	3.60	15,720	6.40	27,520
0.50	3,730	2.10	9,420	3.70	16,140	6.60	28,380
0.60	4,000	2.20	9,840	3.80	16,560	6.80	29,240
0.70	4,280	2.30	10,260	3.90	16,980	7.00	30,100
0.80	4,570	2.40	10,680	4.00	17,400	8.00	34,400
0.90	4,870	2.50	11,100	4.20	18,240	9.00	38,900
1.00	5,190	2.60	11,520	4.40	19,080	10.00	43,600
1.10	5,520	2.70	11,940	4.60	19,920	11.00	48,500
1.20	5,860	2.80	12,360	4.80	20,760	12.00	53,700
1.30	6,220	2.90	12,780	5.00	21,600	13.00	59,200
1.40	6,590	3.00	13,200	5.20	22,440	14.00	65,000
1.50	6,970	3.10	13,620	5.40	23,280	15.00	71,000
1.60	7,360	3.20	14,040	5.60	24,120	16.00	77,000
1.70	7,760	3.30	14,460	5.80	24,960	17.00	83,000
1.80	8,170	3.40	14,880	6.00	25,800		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 31 discharge measurements made during 1899 to 1906, and is well defined between gage heights 0 feet and 24.0 feet. Above gage height, 14.0 feet the rating curve is a tangent, the difference being 600 per tenth.

Monthly discharge of Tennessee River at Knoxville, Tenn., for 1907 and 1908.

[Drainage area, 8,990 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Square mile.		
1907.						
January	34,000	9,000	15,100	1.68	1.94	A.
February	19,500	7,760	12,100	1.35	1.41	B.
March	34,400	9,840	19,800	2.20	2.54	A.
April	22,900	11,100	17,200	1.91	2.13	A.
May	30,100	7,760	14,200	1.58	1.82	B.
June	54,800	8,580	22,600	2.51	2.80	A.
July	26,700	6,220	11,600	1.29	1.49	B.
August	13,200	5,860	8,330	.927	1.07	B.
September	46,000	4,570	10,300	1.15	1.28	B.
October	10,700	4,280	6,110	.680	.78	B.
November	29,200	4,870	12,600	1.40	1.56	B.
December	45,000	6,590	13,900	1.55	1.79	B.
The year	54,800	4,280	13,700	1.52	20.61	
1908.						
January	82,400	13,200	26,200	2.91	3.36	A.
February	72,200	11,900	23,400	2.60	2.80	A.
March	48,500	14,500	26,700	2.97	3.42	A.
April	53,200	11,500	20,900	2.32	2.59	A.
May	25,800	10,700	14,500	1.61	1.86	B.
June	17,400	5,860	10,500	1.17	1.30	B.
July	25,400	5,520	9,830	1.09	1.26	B.
August	31,800	4,000	10,800	1.20	1.38	B.
September	14,000	3,220	5,540	.616	.69	B.
October	30,100	3,220	8,590	.956	1.10	B.
November	22,900	5,860	9,460	1.05	1.17	B.
December	49,000	6,590	19,300	2.15	2.48	A.
The year	82,400	3,220	15,500	1.72	23.41	

TENNESSEE RIVER AT CHATTANOOGA, TENN.

This station is located at the Hamilton County highway bridge in the city of Chattanooga.

The gage, consisting of a sloping section made of railroad rails bolted to solid rock and a vertical section of heavy timber bolted to the vertical face of the rock cliff, was established in 1873 by the United States Army engineers, but since July 1, 1891, it has been in charge of the United States Weather Bureau, by whom gage heights are furnished to the United States Geological Survey.

Discharge measurements were made by the army engineers in 1891 and 1892 and by the Weather Bureau in 1893, and have been continued by the United States Geological Survey since 1897. The data are of great value for scientific studies of run-off and for water-power estimates in connection with the great power possibilities below. A power plant is now under construction about 20 miles down the river, and the completed dam will raise the low-water surface several feet on the Chattanooga gage, thus destroying the usefulness of the gaging station.

Conditions for discharge measurements are good, as is also the station rating curve which has remained practically constant. The gage datum has not been changed and the original iron sloping gage is the standard gage, although a recording gage is also used.

Daily gage height, in feet, of Tennessee River at Chattanooga, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	20.5	5.0	10.4	5.6	7.0	4.5	6.3	5.8	3.0	5.6	2.1	7.0
2	19.6	9.3	12.3	6.3	6.6	5.4	5.8	5.8	2.8	4.8	2.0	5.7
3	15.4	11.2	17.2	7.0	6.2	5.9	5.6	4.5	2.6	4.6	2.2	5.3
4	12.5	10.1	18.4	6.4	6.0	6.1	5.0	4.1	2.6	3.8	2.5	4.8
5	10.7	9.1	16.9	6.1	5.9	7.9	4.6	3.6	2.3	3.5	3.6	4.5
6	9.6	9.5	14.5	5.9	6.7	8.7	4.5	3.5	2.3	3.4	3.7	4.2
7	8.7	9.9	11.2	8.6	7.9	8.4	4.3	3.5	2.4	3.6	3.7	4.0
8	7.9	9.6	9.6	11.2	9.6	7.7	3.9	3.0	2.4	3.9	3.7	3.8
9	7.4	8.7	9.5	9.8	11.8	8.1	3.8	3.0	2.4	3.8	3.2	3.5
10	6.9	7.8	9.5	9.9	12.3	9.8	3.7	2.9	2.5	3.6	2.9	3.5
11	6.6	7.1	10.0	10.0	12.5	13.0	3.6	3.0	2.9	3.3	4.6	3.7
12	6.4	6.6	12.0	9.4	12.2	13.5	3.5	3.5	4.1	3.1	6.3	4.3
13	6.3	6.2	12.3	9.0	10.0	11.4	4.2	4.1	4.6	2.9	8.4	5.0
14	6.0	5.9	11.9	8.1	8.9	9.9	5.6	3.8	4.6	2.9	10.5	5.6
15	5.8	5.6	12.1	7.1	8.2	11.2	7.4	3.5	4.3	2.7	8.1	6.2
16	5.6	5.4	12.6	6.7	8.1	10.3	7.3	3.3	3.6	2.5	6.0	6.6
17	5.4	5.3	12.2	6.5	7.5	15.3	6.3	3.5	3.1	2.2	5.1	6.6
18	5.3	5.0	11.5	6.5	6.9	15.0	6.2	3.6	2.7	2.2	4.5	6.7
19	5.1	4.9	10.6	6.5	6.4	10.4	6.2	3.6	2.6	2.1	4.6	6.4
20	5.1	4.8	9.3	6.9	5.7	8.3	4.9	3.5	2.1	2.1	4.8	5.9
21	5.6	4.7	8.4	7.9	5.5	7.5	4.6	3.4	2.1	2.0	5.3	5.6
22	6.6	4.6	7.7	7.6	5.0	7.1	4.5	4.0	2.1	2.0	6.0	5.2
23	8.0	4.5	7.1	7.4	4.7	6.7	4.2	4.2	3.7	2.0	6.7	5.1
24	7.3	4.4	6.6	8.1	4.6	6.1	3.8	4.1	8.4	2.0	9.4	5.8
25	6.6	4.8	6.1	8.5	4.5	6.1	3.8	4.1	10.2	2.0	12.3	6.5
26	6.1	6.8	5.9	8.5	4.4	6.9	3.7	3.8	10.6	2.0	13.6	7.1
27	5.8	9.2	5.7	8.5	4.4	7.0	3.6	3.9	9.3	2.0	13.3	7.8
28	5.5	10.1	5.5	8.6	4.5	7.0	3.6	3.9	6.8	2.0	12.1	7.7
29	5.3	.....	5.4	8.7	4.5	6.8	3.3	3.6	5.8	2.0	9.3	7.0
30	5.2	.....	5.2	7.6	4.4	7.1	3.4	3.2	5.8	2.1	7.7	7.3
31	5.1	.....	5.0	.....	4.4	.....	4.3	3.0	.....	2.2	.....	14.6
1908.												
1	18.6	6.8	7.4	7.8	10.3	5.4	3.1	3.3	3.8	1.5	6.3	2.3
2	17.9	8.3	7.3	7.3	9.8	5.5	2.9	3.4	3.3	1.4	6.1	2.4
3	15.6	10.2	7.5	7.3	9.6	5.5	2.8	3.4	3.2	1.4	5.0	3.2
4	12.0	9.3	8.4	7.6	9.2	5.3	3.0	3.1	3.0	1.4	4.5	4.8
5	10.7	8.6	9.8	13.4	9.5	5.7	4.5	2.8	2.6	1.4	4.2	5.1
6	13.5	8.3	10.3	14.3	9.6	6.1	5.6	3.2	3.0	1.4	3.4	4.9
7	15.5	9.9	9.5	11.0	10.0	6.1	6.6	4.1	3.7	1.3	3.0	6.1
8	13.7	8.0	8.4	9.0	10.4	6.2	6.9	4.2	4.2	1.3	2.8	10.3
9	12.2	7.5	9.6	8.0	11.2	6.2	6.4	4.7	4.5	1.4	2.7	14.0
10	10.5	8.1	9.8	7.4	11.6	6.0	7.3	5.2	4.9	1.5	2.6	13.1
11	9.5	9.4	8.4	6.9	12.2	5.8	7.3	5.5	4.2	1.7	2.5	11.3
12	9.8	9.4	7.7	6.5	12.0	5.7	6.8	5.0	3.8	2.1	2.4	9.0
13	12.1	9.0	8.4	6.1	7.0	5.6	5.6	4.5	3.3	2.4	2.6	7.5
14	17.8	11.1	10.7	5.8	6.3	5.5	4.6	4.0	2.8	2.4	3.4	7.6
15	20.3	15.7	12.2	5.8	5.9	5.3	4.2	3.6	2.5	2.6	3.5	7.9
16	18.2	21.7	12.8	6.0	5.6	5.3	4.3	3.3	2.3	2.4	3.4	7.6
17	14.2	24.7	9.4	6.3	5.2	5.5	4.5	3.0	2.0	2.2	3.2	6.8
18	12.3	23.7	8.5	6.7	4.9	5.8	4.3	2.9	2.0	2.0	3.0	6.0
19	11.4	20.0	7.9	7.8	4.8	6.1	4.0	2.9	2.0	1.9	2.9	5.4
20	10.2	15.3	7.6	8.2	5.2	6.1	3.7	2.9	1.9	1.9	2.9	5.0
21	9.2	12.0	8.1	7.7	5.6	5.9	3.7	3.4	2.0	1.8	2.8	4.7
22	8.5	10.2	9.8	7.3	6.1	5.7	3.8	4.1	2.0	1.7	2.8	4.6
23	7.7	9.2	11.5	7.0	6.1	5.6	3.5	4.4	2.0	1.5	2.7	7.4
24	7.4	8.4	13.3	6.9	6.0	3.4	3.1	7.3	1.9	1.4	2.7	10.7
25	6.7	7.8	15.9	8.0	5.8	3.4	3.0	7.7	1.8	1.4	2.6	12.1
26	6.1	7.4	16.7	9.8	5.7	3.3	3.0	5.6	1.7	2.2	2.5	11.8
27	5.8	7.5	15.2	11.9	5.5	4.4	2.9	5.6	1.6	3.7	2.5	10.0
28	5.6	7.7	12.9	13.9	5.5	4.4	2.9	5.7	1.6	5.0	2.4	7.9
29	5.6	7.6	10.8	13.8	5.3	4.0	2.8	7.1	1.6	3.8	2.4	7.1
30	6.2	.....	9.3	11.7	5.3	3.7	2.9	6.8	1.5	3.2	2.3	7.2
31	6.1	.....	8.4	.....	5.2	.....	3.1	4.9	.....	3.5	.....	7.6

Rating table for Tennessee River at Chattanooga, Tenn., for 1874 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.30	8,960	3.10	17,390	4.90	27,680	10.00	62,000
1.40	9,350	3.20	17,920	5.00	28,300	11.00	68,800
1.50	9,750	3.30	18,460	5.20	29,550	12.00	75,600
1.60	10,160	3.40	19,000	5.40	30,820	13.00	82,400
1.70	10,580	3.50	19,550	5.60	32,120	14.00	89,200
1.80	11,010	3.60	20,100	5.80	33,450	15.00	96,000
1.90	11,450	3.70	20,660	6.00	34,800	16.00	102,800
2.00	11,900	3.80	21,220	6.20	36,160	17.00	109,600
2.10	12,360	3.90	21,790	6.40	37,520	18.00	116,400
2.20	12,830	4.00	22,360	6.60	38,880	19.00	123,200
2.30	13,310	4.10	22,940	6.80	40,240	20.00	130,000
2.40	13,800	4.20	23,520	7.00	41,600	21.00	136,800
2.50	14,300	4.30	24,100	7.20	42,960	22.00	143,600
2.60	14,800	4.40	24,690	7.40	44,320	23.00	150,400
2.70	15,310	4.50	25,280	7.60	45,680	24.00	157,200
2.80	15,820	4.60	25,870	7.80	47,040	25.00	164,000
2.90	16,340	4.70	26,470	8.00	48,400		
3.00	16,860	4.80	27,070	9.00	55,200		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on 63 discharge measurements made during 1891 to 1906 and is well defined between gage heights 0 foot and 35.0 feet. Above gage height 6.0 feet the rating curve is a tangent, the difference being 680 per tenth.

Monthly discharge of Tennessee River at Chattanooga, Tenn., for 1907 and 1908.

[Drainage area, 21,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	133,000	28,900	47,500	2.22	2.56	A.
February	70,200	24,700	41,800	1.95	2.03	A.
March	119,000	28,300	62,700	2.93	3.38	A.
April	70,200	32,100	47,200	2.21	2.47	A.
May	79,000	24,700	41,900	1.96	2.26	A.
June	98,000	25,300	52,800	2.47	2.76	A.
July	44,300	18,500	26,800	1.25	1.44	A.
August	33,400	16,300	21,100	.986	1.14	A.
September	66,100	12,400	23,900	1.12	1.25	A.
October	32,100	11,900	16,400	.766	.88	B.
November	86,500	11,900	37,600	1.76	1.96	A.
December	93,300	19,600	34,500	1.61	1.86	A.
The year	133,000	11,900	37,800	1.77	23.99	
1908.						
January	132,000	32,100	71,000	3.32	3.83	A.
February	162,000	40,200	69,700	3.26	3.52	A.
March	108,000	43,600	62,800	2.93	3.38	A.
April	91,200	33,400	52,300	2.44	2.72	A.
May	77,000	27,100	45,000	2.10	2.42	A.
June	36,200	18,500	30,300	1.42	1.58	A.
July	43,600	15,800	24,600	1.15	1.33	A.
August	46,400	15,800	25,300	1.18	1.36	A.
September	27,700	9,750	15,500	.724	.81	B.
October	28,300	8,960	12,600	.589	.68	B.
November	36,800	13,300	18,200	.850	.95	B.
December	89,200	13,300	45,100	2.11	2.43	A.
The year	162,000	8,960	39,400	1.84	25.01	

DAVIDSON RIVER NEAR DAVIDSON RIVER, N. C.

Davidson River, which empties into French Broad River near Davidson River, N. C., is a typical small mountain stream, rising very rapidly after a rain and falling almost as fast after it is over. The rapid fluctuation to which the stream is subject makes it difficult to catch the floods to measure flood stages which carry off a large per cent of the total flow.[a]

The gaging station which was established May 19, 1904, at the request and by cooperation of Dr. C. A. Schenck of the Biltmore estate, for the purpose of studying the water resources and power possibilities of that section, is located at English bridge, about 2 miles from Davidson River, N. C., and 500 feet from the mouth of Avery Creek. It is about 2 miles above the mouth of the river.

Discharge measurements of Davidson River near Davidson River, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 5	Warren E. Hall	68	98	0.90	68
May 4	do	70	128	1.30	151
July 16	do	70	109	1.05	93
September 21	do	75	88	.72	34
December 14	do	70	156	1.62	275
1908.					
July 18	F. P. Thomas	62	114	1.08	109

Daily gage height, in feet, of Davidson River near Davidson River, N. C., for 1907 and 1908.

[Observer, Mrs. C. T. Rankin.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1.5	1.1	1.5	0.95	1.0	1.9	0.85	0.8	0.75	0.95	0.75	0.95
2	1.35	1.05	1.2	.9	1.0	1.25	.8	.8	.70	.9	1.1	.95
3	1.3	1.0	1.1	.9	1.4	1.25	.8	.8	.8	.9	.85	.95
4	1.25	1.25	1.1	.9	1.45	1.1	.8	.8	.8	.85	.8	.95
5	1.2	1.2	1.05	.9	1.2	1.05	.8	.75	.75	.85	.8	1.0
6	1.2	1.1	1.0	1.6	1.15	1.0	.8	.85	.7	.8	.75	1.2
7	1.2	1.1	1.0	1.1	1.35	1.0	.8	.75	.7	.8	.75	1.05
8	1.15	1.05	1.1	1.05	1.25	1.5	.8	.8	.8	.9	.75	.9
9	1.15	1.05	1.0	1.05	1.2	1.05	.8	.75	.75	.8	.75	1.25
10	1.1	1.0	1.1	1.0	1.2	1.0	.8	.75	.9	.8	.8	1.6
11	1.1	1.0	1.05	1.0	1.2	1.0	.8	1.25	.85	.8	([b])	1.25
12	1.1	1.0	1.05	1.0	1.1	1.0	.8	.95	.75	.8	([b])	1.05
13	1.1	1.0	1.0	.95	1.1	.95	.9	.8	.75	.75	([b])	1.1
14	1.05	.95	1.1	.95	1.1	.95	.8	.9	.75	.75	([b])	1.7
15	1.05	.95	1.05	1.0	1.15	.95	1.3	.9	.75	.75	([b])	1.4
16	1.05	.95	1.0	.95	1.05	.9	1.1	.9	.75	.75	([b])	1.3
17	1.0	.95	1.0	.95	1.05	.9	1.0	.9	.75	.75	.75	1.2
18	1.0	.95	1.0	.9	1.05	.9	.9	.9	.75	.75	1.2	1.25
19	1.0	.95	1.0	1.15	1.0	.9	.9	.85	.75	.75	.95	1.2
20	1.2	.95	1.0	.95	.95	.9	.9	.8	.75	.75	.8	1.1

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey, and will be republished by the North Carolina Geological Survey, by Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

[b] No record November 11 to 16.

Daily gage height, in feet, of Davidson River near Davidson River, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	1.05	0.9	0.95	0.95	0.95	0.9	0.85	0.9	0.7	0.75	1.7	1.1
22	1.0	.9	.95	1.2	.95	.9	.8	.9	.9	.75	1.25	1.5
23	1.0	.9	.9	1.3	1.4	.9	.8	.9	2.7	.75	1.6	2.1
24	1.0	1.0	.9	1.2	1.0	.9	1.15	.85	1.05	.75	1.6	1.5
25	1.0	1.1	.9	1.1	1.0	.9	1.25	.8	.95	.75	1.3	1.4
26	1.0	1.05	1.05	1.05	1.4	.85	.85	.8	.9	.75	1.2	1.3
27	1.0	1.0	.95	1.2	1.05	.85	.8	.8	.85	.9	1.1	1.25
28	1.0	1.0	.95	1.05	1.0	.95	1.05	.75	1.3	.8	1.05	1.75
29	.95	.....	.9	1.0	.95	1.0	.9	.75	1.15	.75	1.0	1.2
30	.95	.....	.9	1.0	.95	.85	.85	.75	1.0	.75	1.0	2.2
31	.95	.....	1.0	.....	1.2	.....	.8	.75	.....	.75	.....	1.45
1908.												
1	1.35	1.25	1.45	1.25	1.3	1.15	.95	.95	1.25	1.0	1.25	.9
2	1.3	1.2	1.4	1.25	1.3	1.15	1.0	.95	1.2	.95	1.15	.9
3	1.25	1.35	1.4	1.2	1.25	1.1	1.25	.95	1.2	.95	1.15	1.05
4	1.2	1.45	1.35	1.2	1.2	1.1	1.75	1.0	1.15	.9	1.1	.95
5	1.35	1.1	1.35	1.2	1.2	1.15	1.8	1.2	1.65	.9	1.1	.95
6	1.3	1.2	1.35	1.2	1.2	1.15	1.4	1.1	1.45	.9	1.1	.9
7	1.3	1.15	1.3	1.15	1.9	1.2	1.5	1.05	1.4	.9	1.05	1.35
8	1.2	1.15	1.3	1.15	1.4	1.15	1.45	1.1	1.3	.9	1.0	1.3
9	1.15	1.1	1.3	1.15	1.35	1.15	1.35	1.15	1.25	1.3	1.0	1.2
10	1.1	1.15	1.25	1.1	1.3	1.1	1.3	1.05	1.25	1.2	1.0	1.15
11	2.0	1.25	1.25	1.1	1.25	1.1	1.2	1.1	1.2	1.0	1.05	1.1
12	2.1	1.55	1.45	1.1	1.2	1.1	1.15	1.1	1.15	1.0	1.0	1.2
13	1.65	1.7	1.25	1.1	1.2	1.15	1.15	1.0	1.1	.95	1.0	1.1
14	1.5	1.8	1.25	1.1	1.2	1.15	1.15	.95	1.1	.95	1.15	1.1
15	1.45	3.2	1.2	1.7	1.15	1.5	1.15	.95	1.05	.95	1.15	1.05
16	1.4	2.05	1.2	1.45	1.15	1.15	1.1	.95	1.05	.95	1.0	1.05
17	1.35	1.8	1.2	1.35	1.5	1.1	1.05	.95	1.05	.95	1.0	1.05
18	1.3	1.65	1.15	1.3	1.3	1.1	1.05	.95	1.0	.9	1.0	1.0
19	1.25	1.6	1.15	1.25	1.35	1.05	1.05	1.1	1.0	.9	1.0	1.0
20	1.25	1.55	1.35	1.2	1.2	1.05	1.0	1.1	1.0	.9	1.0	1.0
21	1.25	1.5	1.4	1.2	1.2	1.1	1.0	1.05	1.0	.9	1.0	1.0
22	1.2	1.45	1.3	1.15	1.15	1.1	1.0	2.0	1.0	.9	.95	1.7
23	1.2	1.4	1.75	1.15	1.1	1.05	1.1	1.55	1.0	1.8	.95	1.3
24	1.15	1.4	1.8	1.15	1.15	1.05	1.0	2.5	1.0	1.3	.95	1.25
25	1.3	1.35	1.55	2.25	1.15	1.05	1.1	2.65	1.0	1.15	.95	1.2
26	1.15	1.4	1.45	1.6	1.15	1.0	1.05	2.0	.95	1.1	.95	1.1
27	1.25	1.3	1.4	1.45	1.25	1.0	1.0	1.65	.95	1.05	.95	1.1
28	1.15	1.35	1.35	1.4	1.15	1.0	1.05	1.55	1.2	1.3	.95	1.1
29	1.1	1.3	1.25	1.35	1.45	.95	1.0	1.45	1.0	2.3	.9	1.1
30	1.1	.....	1.25	1.4	1.3	.95	1.0	1.35	1.0	1.45	.9	1.1
31	1.1	.....	1.25	.....	1.2	.....	.95	1.3	.....	1.3	.....	1.2

Rating table for Davidson River near Davidson River, N. C., for 1906 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	32	1.40	176	2.10	520	2.80	1,075
0.80	44	1.50	210	2.20	590	2.90	1,170
0.90	60	1.60	250	2.30	660	3.00	1,265
1.00	79	1.70	295	2.40	735	3.10	1,360
1.10	100	1.80	345	2.50	815	3.20	1,460
1.20	122	1.90	400	2.60	895	3.30	1,560
1.30	147	2.00	460	2.70	985	3.40	1,660

NOTE.—The above table is applicable only for open-channel conditions. It is based upon 25 discharge measurements made during 1904 to 1909 and is well defined between gage heights 0.7 feet and 1.3 feet. Above gage height 1.3 feet it is based on one measurement at gage height 2.74 feet. Above gage height 3.1 feet the rating curve is a tangent, the difference being 100 per tenth.

Monthly discharge of Davidson River near Davidson River, N. C., for 1907 and 1908.

[Drainage area, 41 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	210	70	101	2.46	2.84	B.
February	134	60	82.8	2.02	2.10	B.
March	210	60	85.5	2.09	2.41	B.
April	250	60	89.9	2.19	2.44	B.
May	193	70	108	2.63	3.03	B.
June	400	52	88.9	2.17	2.42	B.
July	147	44	60.4	1.47	1.70	B
August	134	38	51.1	1.25	1.44	B.
September	985	32	82.7	2.02	2.25	B.
October	70	38	44.1	1.08	1.24	B.
November[a]	295	38	84.7	2.07	2.31	B.
December	590	60	166	4.05	4.67	B.
The year	985	32	87.1	2.12	28.85	
1908.						
January	520	100	163	3.98	4.59	B.
February	1,460	100	237	5.78	6.23	B.
March	345	111	165	4.02	4.64	B.
April	625	100	156	3.80	4.24	B.
May	400	111	142	3.46	3.99	B.
June	210	70	102	2.49	2.78	B.
July	345	70	122	2.98	3.44	B.
August	940	70	185	4.51	5.20	B.
September	272	70	110	2.68	2.99	B.
October	660	60	114	2.78	3.20	B.
November	134	60	84.6	2.06	2.30	B.
December	295	60	106	2.59	2.99	B.
The year	1,460	60	141	3.43	46.59	

[a] November 11–16, 1907, discharge interpolated.

LITTLE RIVER AT CALHOUN, N. C.

This station is located at a wooden wagon bridge about one-half mile above the mouth of the river, which is tributary to French Broad River. The station was formerly used for making miscellaneous measurements, but on May 4, 1907, was equipped with a gage which was maintained in cooperation with the Forest Service for the purpose of studying the water resources of the section.

The current is rather slow at low stage and is also irregular, making conditions rather poor for accurate work.

The station was discontinued on June 30, 1908.[a]

Discharge measurements of Little River at Calhoun, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 4	Warren E. Hall	42	104	2.00	198
July 16	do	36	63	1.20	96
September 21	do	34	49	.80	51
December 16	do	45	158	3.18	408

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Little River at Calhoun, N. C., for 1907 and 1908.

[Observer, P. S. Shuford.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.25	1.25	0.9	0.8	1.0	.....	1.4
2	.....	.....	.....	.....	.....	2.0	1.20	.9	.8	1.0	1.5	1.35
3	.....	.....	.....	.....	.....	1.7	1.15	.9	1.0	1.0	.....	1.3
4	.....	.....	.....	.....	2.0	1.5	1.1	.8	1.0	.9	.....	1.3
5	.....	.....	.....	.....	1.8	1.5	1.1	.9	.9	.9	.9	1.45
6	.....	.....	.....	.....	1.8	1.4	1.0	.9	.9	1.0	.9	1.3
7	.....	.....	.....	.....	2.1	1.35	.9	1.0	.8	1.5	.9	1.2
8	.....	.....	.....	.....	1.9	1.7	.9	1.0	1.0	1.1	.8	1.9
9	.....	.....	.....	.....	1.8	1.45	.8	.9	.9	1.0	.8	1.4
10	.....	.....	.....	.....	1.7	1.7	.9	.9	.9	1.0	1.5	4.4
11	.....	.....	.....	.....	1.8	1.45	1.9	1.55	.8	.9	1.0	3.0
12	.....	.....	.....	.....	1.7	1.4	1.3	1.2	.8	.9	1.0	2.7
13	.....	.....	.....	.....	1.6	1.3	1.25	1.0	.8	.8	1.0	3.6
14	.....	.....	.....	.....	1.5	1.25	1.3	1.0	.8	.....	1.0	7.1
15	.....	.....	.....	.....	1.6	1.25	1.25	1.5	.8	.....	.9	4.5
16	.....	.....	.....	.....	1.6	1.2	1.2	1.2	.8	.....	.9	3.15
17	.....	.....	.....	.....	1.5	1.2	1.15	1.0	.8	.....	.9	2.85
18	.....	.....	.....	.....	1.4	1.15	1.2	1.3	.8	.....	2.85	2.5
19	.....	.....	.....	.....	1.4	1.1	1.2	1.2	.8	.....	1.8	2.1
20	.....	.....	.....	.....	1.3	1.1	1.15	1.4	.....	.....	4.2	2.0
21	.....	.....	.....	.....	1.3	1.15	1.1	1.1	.....	.....	3.4	1.95
22	.....	.....	.....	.....	1.3	1.1	1.0	1.0	1.0	.....	2.6	1.8
23	.....	.....	.....	.....	1.3	1.6	.9	1.0	5.4	.....	2.7	8.2
24	.....	.....	.....	.....	1.3	1.3	1.3	1.1	2.0	.....	5.2	4.5
25	.....	.....	.....	.....	1.25	1.3	1.2	1.0	1.3	.....	2.95	4.1
26	.....	.....	.....	.....	2.2	1.3	1.1	.9	1.1	.....	2.3	3.5
27	.....	.....	.....	.....	1.5	2.3	1.0	.9	.9	.....	2.0	3.2
28	.....	.....	.....	.....	1.4	1.3	1.0	.8	1.0	.....	1.8	2.5
29	.....	.....	.....	.....	1.35	2.0	.9	.8	1.4	.....	1.5	2.25
30	.....	.....	.....	.....	1.3	.....	1.0	.8	1.0	.....	1.2	4.5
31	.....	.....	.....	.....	1.4	.....	1.0	.8	.....	.....	.....	3.65

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	3.0	1.9	2.65	2.2	3.4	1.5	16	2.8	8.4	2.0	3.4	1.7	1.5
2	2.65	2.0	2.6	2.1	3.2	1.45	17	2.6	3.8	1.9	3.35	3.0	1.4
3	2.45	2.1	2.55	2.0	3.0	1.4	18	2.5	3.7	1.85	2.75	2.0	1.3
4	2.2	2.1	2.5	2.0	2.7	1.35	19	2.3	3.3	1.8	2.5	2.5	1.2
5	2.7	2.2	2.4	1.9	2.45	2.5	20	2.1	3.1	2.35	2.4	2.1	1.15
6	2.45	1.15	2.35	2.0	2.3	1.7	21	2.0	3.0	2.5	2.25	1.85	1.3
7	2.5	2.1	2.3	2.3	2.85	1.55	22	2.0	2.9	3.0	2.2	1.75	1.25
8	2.3	2.0	2.2	2.0	2.35	1.45	23	1.95	2.8	4.4	2.15	1.7	1.25
9	2.15	2.4	2.15	2.0	2.15	1.4	24	1.9	2.75	5.8	2.1	2.0	1.35
10	2.0	2.9	2.1	1.9	2.0	1.55	25	1.85	2.7	4.1	5.2	1.9	1.3
11	4.2	3.5	2.1	1.85	1.9	1.5	26	1.9	3.7	3.2	3.4	1.75	1.25
12	8.1	3.9	2.45	1.8	1.8	1.45	27	1.85	3.5	2.75	3.0	1.6	1.2
13	4.2	4.5	2.2	1.7	1.8	1.5	28	1.8	3.0	2.55	2.9	1.55	1.15
14	3.55	5.8	2.1	1.7	1.75	1.6	29	1.9	2.8	2.4	2.8	1.6	1.1
15	3.3	10.0	2.0	4.2	1.7	1.55	30	1.8	.....	2.3	3.6	1.7	1.1
							31	1.8	.....	2.25	.....	1.55	.....

Daily discharge, in second-feet, of Little River at Calhoun, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	101	61	51	71	46	119
2	.....	.....	.....	.....	.....	199	95	61	51	71	131	113
3	.....	.....	.....	.....	.....	157	89	61	71	71	71	107
4	.....	.....	.....	.....	199	131	83	51	71	61	66	107
5	.....	.....	.....	.....	171	131	83	61	61	61	61	125
6	.....	.....	.....	.....	171	119	71	61	61	71	61	107
7	.....	.....	.....	.....	214	113	61	71	51	131	61	95
8	.....	.....	.....	.....	185	157	61	71	71	83	51	185
9	.....	.....	.....	.....	171	125	51	61	61	71	51	119
10	.....	.....	.....	.....	157	157	61	61	61	71	131	.....
11	.....	.....	.....	.....	171	125	185	137	51	61	71	370
12	.....	.....	.....	.....	157	119	107	95	51	61	71	316
13	.....	.....	.....	.....	143	107	101	71	51	51	71	.....
14	.....	.....	.....	.....	131	101	107	71	51	46	71	.....
15	.....	.....	.....	.....	143	101	101	131	51	46	61	.....
16	.....	.....	.....	.....	143	95	95	95	51	46	61	400
17	.....	.....	.....	.....	131	95	89	71	51	46	61	343
18	.....	.....	.....	.....	119	89	95	107	51	46	343	280
19	.....	.....	.....	.....	119	83	95	95	51	46	171	214
20	.....	.....	.....	.....	107	83	89	119	46	46	.....	199
21	.....	.....	.....	.....	107	89	83	83	46	46	.....	192
22	.....	.....	.....	.....	107	83	71	71	71	46	298	171
23	.....	.....	.....	.....	107	143	61	71	.....	46	316	.....
24	.....	.....	.....	.....	107	107	107	83	199	46	.....	.....
25	.....	.....	.....	.....	101	107	95	71	107	46	361	.....
26	.....	.....	.....	.....	230	107	83	61	83	46	246	.....
27	.....	.....	.....	.....	131	246	71	61	61	46	199	410
28	.....	.....	.....	.....	119	107	71	51	71	46	171	280
29	.....	.....	.....	.....	113	199	61	51	119	46	131	238
30	.....	.....	.....	.....	107	.....	71	51	71	46	95	.....
31	.....	.....	.....	.....	119	.....	71	51	.....	46	.....	.....

NOTE.—Discharge for September 20 to 21 and October 14 to November 1, 1907, estimated from comparison of gage heights of adjacent streams.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	370	185	307	230	.....	131	16	334	.....	199	.....	157	131
2	307	199	298	214	410	125	17	298	.....	185	.....	370	119
3	271	214	289	199	370	119	18	280	.....	178	325	199	107
4	230	214	280	199	316	113	19	246	.....	171	280	280	95
5	316	230	262	185	271	280	20	214	390	254	262	214	89
6	271	89	254	199	246	157	21	199	370	280	238	178	107
7	280	214	246	246	343	137	22	199	352	370	230	164	101
8	246	199	230	199	254	125	23	192	334	.....	222	157	101
9	222	262	222	199	222	119	24	185	325	.....	214	199	163
10	199	352	214	185	199	137	25	178	316	.....	.....	185	107
11	.....	.....	214	178	185	131	26	185	.....	410	.....	164	101
12	.....	.....	271	171	171	125	27	178	.....	325	370	143	95
13	.....	.....	230	157	171	131	28	171	370	289	352	137	89
14	.....	.....	214	157	164	143	29	185	334	262	334	143	83
15	.....	.....	199	.....	157	137	30	171	.....	246	.....	157	83
							31	171	.....	238	.....	137	.....

NOTE.—Daily discharges for 1907 and 1908 based on a well defined rating curve. From May 4, 1907, to June 30, 1908, the discharge was greater than 420 second-feet for all missing days.

NORTH FORK OF MILLS RIVER AT PINKBED, N. C.

This station is located at the wagon bridge in the village of Pinkbed, and is 1 mile above the junction of North and South forks. It was established May 18, 1904, and was originally maintained in

cooperation with the Biltmore estate, in whose forest reserves the drainage area lies. The data obtained are useful for water-power estimates and for general run-off studies, including those of the larger rivers below.

This is a small stream, very swift-running at most places. At the station the ordinary water stage is shallow with a relatively rough bed of loose rock, conditions which are not very favorable for accurate measurements or a constant rating curve.[a]

Discharge measurements of North Fork of Mills River at Pinkbed, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 3	Warren E. Hall	37	25	0.95	44
Do	do	35	25	.95	46
July 15	do	35	22	.85	40
September 20	do	32	14	.56	18
December 13	do	37	25	.90	44
1908.					
July 17	F. P. Thomas	40	33	.85	45
Do	do	40	36	.80	49

Daily gage height, in feet, of North Fork of Mills River at Pinkbed, N. C., for 1907 and 1908.

[Observers, J. T. Davenport and R. K. Whitaker.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1.5	1.0	1.0	1.0	1.1	1.5	0.9	0.9	0.65	0.8	0.75	0.85
2	1.4	1.0	1.2	1.0	1.05	1.2	.9	.85	.65	.75	1.0	.8
3	1.35	1.0	1.1	1.0	1.7	1.2	.9	.8	.65	.75	.8	.8
4	1.25	1.05	1.05	1.0	1.6	1.15	.9	.8	.65	.7	.7	.8
5	1.2	1.1	1.05	.95	1.4	1.1	.9	.8	.65	.7	.7	.8
6	1.15	1.0	1.0	1.5	1.4	1.1	.9	.75	.65	.7	.7	.8
7	1.15	1.0	1.0	1.1	1.4	1.05	.9	.75	.65	.7	.7	.8
8	1.15	1.1	1.0	1.1	1.25	1.3	.9	.7	.65	.7	.7	.8
9	1.1	1.05	1.0	1.05	1.2	1.1	.9	.7	.7	.7	.7	.85
10	1.1	1.0	1.0	1.05	1.2	1.1	.9	.7	.7	.7	.7	1.2
11	1.1	1.0	1.0	1.0	1.2	1.05	.9	.7	.7	.7	.7	1.15
12	1.1	1.0	1.0	1.0	1.2	1.0	.9	.75	.7	.7	.7	1.15
13	1.1	1.0	1.0	1.0	1.2	1.0	.9	.75	.7	.7	.7	.95
14	1.1	1.0	1.0	1.0	1.15	1.0	.9	.75	.7	.7	.7	1.35
15	1.1	.95	1.0	1.0	1.15	1.0	.9	.7	.7	.7	.7	1.2
16	1.1	.95	1.0	1.0	1.1	1.0	.9	.7	.7	.7	.7	1.15
17	1.1	.95	1.0	1.0	1.1	.95	.9	.7	.7	.7	.7	1.0
18	1.1	.95	1.0	1.0	1.1	.95	.9	.8	.7	.7	1.0	1.0
19	1.05	.95	.95	1.1	1.1	.95	.85	.8	.65	.7	.95	1.0
20	1.05	.95	.95	1.0	1.1	1.0	.8	.8	.65	.7	.95	1.0
21	1.05	.95	.95	1.0	1.1	1.05	.8	.8	.65	.7	1.45	.95
22	1.05	.95	.9	1.2	1.05	1.0	.8	8	.65	.7	.95	.9
23	1.0	.95	.9	1.1	1.0	1.0	.8	.8	2.3	.7	1.0	2.5
24	1.0	1.0	.9	1.1	1.1	1.0	.8	.8	.9	.7	1.2	1.4
25	1.0	1.0	.9	1.05	1.1	1.0	.9	.7	.8	.7	1.1	1.25

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of North Fork of Mills River at Pinkbed, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907												
26	1.0	1.0	0.9	1.05	1.3	0.95	0.9	0.7	0.75	0.7	1.05	1.1
27	1.0	1.0	.9	1.2	1.2	1.0	.9	.7	.8	.7	1.0	1.1
28	1.0	1.0	.9	1.1	1.1	1.0	.9	.7	.9	.7	.95	1.1
29	1.0	.....	.9	1.1	1.1	1.1	.9	.7	.9	.7	.9	1.1
30	1.0	.....	.9	1.1	1.0	.9	1.0	.7	.85	.7	.85	1.7
31	1.0	.....	.9	.....	1.1	.....	.9	.65	.....	.7	.....	1.3
1908.												
1	1.25	1.1	1.35	1.2	1.25	1.0	.8	1.0	1.2	.9	1.45	.9
2	1.2	1.1	1.35	1.2	1.2	1.0	.8	1.0	1.05	.85	1.35	.9
3	1.15	1.2	1.3	1.15	1.2	1.0	.9	.9	1.0	.85	1.3	.95
4	1.1	1.2	1.3	1.15	1.15	1.0	1.6	.9	1.0	.85	1.25	.95
5	1.1	1.2	1.3	1.1	1.15	1.1	1.1	.9	1.5	.85	1.2	.9
6	1.1	1.1	1.3	1.1	1.15	1.05	1.1	1.25	1.3	.85	1.15	.95
7	1.15	1.05	1.25	1.1	1.6	1.05	1.1	1.1	1.2	.8	1.1	1.8
8	1.1	1.05	1.25	1.1	1.35	1.0	1.2	1.05	1.1	.8	1.1	1.3
9	1.05	1.05	1.25	1.1	1.3	.9	1.5	1.0	1.1	1.05	1.1	1.2
10	1.0	1.05	1.2	1.05	1.25	1.0	1.25	1.0	1.05	1.15	1.1	1.1
11	1.05	1.1	1.2	1.05	1.2	1.05	1.25	1.0	1.05	1.0	1.1	1.1
12	2.3	1.4	1.2	1.05	1.2	1.0	1.1	.95	1.0	.9	1.05	1.1
13	1.3	1.6	1.2	1.05	1.15	.95	1.0	.9	1.0	.8	1.05	1.1
14	1.25	1.8	1.2	1.0	1.1	.95	.9	.9	1.0	.8	1.15	1.05
15	1.2	3.4	1.1	1.5	1.1	1.05	.9	.9	1.0	.8	1.1	1.05
16	1.2	2.7	1.1	1.2	1.1	1.0	.9	.9	1.0	.8	1.05	1.05
17	1.2	2.2	1.1	1.15	1.5	.95	.9	.85	.95	.8	1.05	1.0
18	1.2	1.7	1.1	1.1	1.15	.95	.9	1.0	.95	.8	1.05	1.0
19	1.2	1.6	1.1	1.1	1.15	.9	.85	.9	.9	.8	1.0	1.0
20	1.15	1.5	1.1	1.1	1.3	.9	.85	.95	.9	.8	1.0	1.0
21	1.1	1.5	1.1	1.1	1.15	.9	.85	.95	.9	.8	1.0	1.0
22	1.1	1.4	1.1	1.1	1.1	.85	.85	1.5	.9	.85	1.0	1.7
23	1.1	1.4	1.35	1.05	1.1	.85	1.15	1.3	.9	1.9	1.0	1.4
24	1.1	1.35	1.35	1.05	1.1	.85	.9	1.7	.9	1.4	1.0	1.25
25	1.1	1.35	1.3	2.25	1.1	.85	.85	2.3	.9	1.15	1.0	1.2
26	1.1	1.5	1.3	1.55	1.05	.85	.85	2.1	.9	1.1	1.0	1.15
27	1.05	1.35	1.3	1.4	1.05	.8	.85	1.7	.9	1.05	.95	1.15
28	1.05	1.35	1.25	1.3	1.0	.8	1.0	1.5	1.1	1.4	.95	1.15
29	1.05	1.3	1.25	1.25	1.1	.8	1.1	1.4	.9	3.1	.9	1.1
30	1.05	.....	1.2	1.3	1.1	.8	1.35	1.3	.9	1.9	.9	1.1
31	1.1	.....	1.2	.....	1.05	.....	1.1	1.25	.....	1.6	.....	1.15

Rating table for North Fork of Mills River at Pinkbed, N. C., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.60	24	1.40	125	2.20	340	3.00	640
.70	30	1.50	150	2.30	370	3.10	685
.80	37	1.60	175	2.40	405	3.20	730
.90	46	1.70	200	2.50	440	3.30	780
1.00	57	1.80	225	2.60	475	3.40	830
1.10	70	1.90	250	2.70	515		
1.20	85	2.00	280	2.80	555		
1.30	103	2.10	310	2.90	595		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon four discharge measurements made during 1907 and one high-water measurement of 1906, and is fairly well defined.

Monthly discharge of North Fork of Mills River at Pinkbed, N. C., for 1907 and 1908.

[Drainage area, 24 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	150	57	73.3	3.05	3.52	C.
February	70	52	56.8	2.37	2.47	C.
March	85	46	54.7	2.28	2.63	C.
April	150	52	66.2	2.76	3.08	C.
May	200	57	86.3	3.60	4.15	C.
June	150	46	66.0	2.75	3.07	C.
July	57	37	44.8	1.87	2.16	C.
August	46	27	33.7	1.40	1.61	C.
September	370	27	42.7	1.78	1.99	C.
October	37	30	30.5	1.27	1.46	C.
November	138	30	45.7	1.90	2.12	C.
December	440	37	80.0	3.33	3.84	C.
The year	440	27	56.7	2.36	32.10	
1908.						
January	370	57	84.4	3.52	4.06	C.
February	830	64	160.0	6.67	7.19	C.
March	114	70	90.4	3.77	4.35	C.
April	355	57	90.7	3.78	4.22	C.
May	175	57	83.8	3.49	4.02	C.
June	70	37	51.1	2.13	2.38	C.
July	175	37	65.0	2.71	3.12	C.
August	370	42	94.9	3.95	4.55	C.
September	150	46	61.1	2.55	2.84	C.
October	685	37	89.4	3.72	4.29	C.
November	138	46	69.4	2.89	3.22	C.
December	225	46	78.1	3.25	3.75	C.
The year	830	37	84.9	3.54	47.99	

SOUTH FORK OF MILLS RIVER NEAR SITTON, N. C.

This station is located at a footbridge about 1 mile below Sitton's mill, Sitton, N. C., and 1 mile above the junction of North and South forks.

It was established May 18, 1904, for the purpose of determining general run-off data, and like the station on North Fork of Mills River was originally maintained in cooperation with the Biltmore estate.[a]

Discharge measurements of South Fork of Mills River near Sitton, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 3	Warren E. Hall	50	83	1.22	93
Do	do	50	83	1.22	91
July 15	do	50	83	1.27	90
Do	F. P. Thomas	50	83	1.27	91
September 19	Warren E. Hall	50	66	.91	34
September 20	do	50	68	.91	36
December 13	do	55	85	1.35	105
1908.					
July 17	F. P. Thomas	45	85	1.25	98
Do	do	45	87	1.25	94

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of South Fork of Mills River near Sitton, N. C., for 1907 and 1908.

[Observer, W. E. Field.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.0	1.35	1.3	1.35	1.35	2.3	1.3	1.1	0.95	1.15	1.0	1.25
2	1.8	1.35	2.1	1.25	1.3	1.85	1.3	1.1	.95	1.1	1.3	1.2
3	1.7	1.35	1.55	1.25	2.2	1.7	1.35	1.1	1.05	1.05	1.15	1.2
4	1.7	1.4	1.45	1.2	2.15	1.6	1.3	1.05	1.1	1.05	1.05	1.2
5	1.6	1.5	1.4	1.2	1.8	1.55	1.25	1.05	1.1	1.05	1.0	1.25
6	1.6	1.4	1.35	1.75	1.7	1.5	1.25	1.1	1.0	1.0	1.0	1.3
7	1.55	1.35	1.35	1.45	1.8	1.45	1.2	1.05	1.0	1.0	1.0	1.2
8	1.55	1.3	1.4	1.4	1.65	1.6	1.15	1.1	1.0	1.15	1.0	1.1
9	1.5	1.3	1.3	1.4	1.6	1.5	1.15	1.05	1.0	1.05	1.0	1.4
10	1.5	1.3	1.35	1.35	1.55	1.5	1.15	1.25	1.1	1.0	1.05	2.1
11	1.45	1.3	1.35	1.3	1.6	1.4	1.25	1.15	1.05	1.0	1.1	1.5
12	1.45	1.3	1.3	1.3	1.5	1.4	1.2	1.25	1.0	1.0	1.05	1.45
13	1.45	1.3	1.3	1.3	1.45	1.35	1.25	1.1	.95	1.0	1.05	1.4
14	1.4	1.3	1.3	1.3	1.45	1.35	1.15	1.1	.95	1.0	1.0	2.1
15	1.4	1.25	1.45	1.25	1.45	1.35	1.3	1.1	.95	1.0	1.0	1.85
16	1.4	1.25	1.3	1.25	1.45	1.3	1.35	1.1	1.0	1.0	1.0	1.65
17	1.4	1.25	1.3	1.25	1.4	1.3	1.3	1.3	.95	1.0	1.0	1.55
18	1.4	1.25	1.3	1.25	1.4	1.25	1.4	1.1	.95	1.0	1.35	1.5
19	1.4	1.25	1.3	1.4	1.35	1.25	1.25	1.1	.9	.95	1.2	1.45
20	1.45	1.25	1.3	1.25	1.35	1.6	1.15	1.05	.9	.95	1.15	1.4
21	1.4	1.2	1.25	1.25	1.3	1.5	1.1	1.05	.9	.95	2.45	1.35
22	1.35	1.2	1.25	1.35	1.3	1.35	1.1	1.1	.95	.95	1.85	1.35
23	1.35	1.2	1.2	1.8	1.3	1.35	1.15	1.15	4.10	.95	2.0	3.1
24	1.35	1.3	1.2	1.5	1.3	1.35	1.15	1.1	1.3	.95	2.1	2.1
25	1.3	1.35	1.2	1.4	1.4	1.5	1.4	1.05	1.15	.95	1.7	1.85
26	1.35	1.35	1.25	1.4	2.6	1.45	1.2	1.05	1.1	.95	1.5	1.7
27	1.3	1.35	1.25	1.5	1.75	1.55	1.15	1.0	1.05	1.05	1.4	1.65
28	1.3	1.3	1.2	1.4	1.55	1.55	1.35	1.0	1.35	1.05	1.35	1.6
29	1.3	.....	1.2	1.4	1.50	1.4	1.2	1.0	1.4	1.0	1.3	1.5
30	1.3	.....	1.2	1.35	1.45	1.3	1.25	1.0	1.2	1.0	1.25	2.45
31	1.3	.....	1.3	.....	1.6	.....	1.15	1.0	.....	1.0	.....	2.0
1908.												
1	1.7	1.55	1.85	1.5	1.6	1.25	1.05	1.25	1.6	1.15	1.8	1.3
2	1.6	1.45	1.9	1.5	1.55	1.25	1.05	1.2	1.55	1.15	1.7	1.25
3	1.55	1.65	1.9	1.45	1.5	1.25	1.3	1.25	1.5	1.15	1.65	1.2
4	1.5	1.45	1.85	1.4	1.5	1.25	1.6	1.2	1.45	1.15	1.6	1.2
5	1.75	1.3	1.8	1.4	1.45	1.3	2.45	1.15	2.35	1.15	1.5	1.2
6	1.55	1.4	1.8	1.45	1.45	1.3	1.9	1.4	2.0	1.15	1.45	1.2
7	1.55	1.35	1.75	1.4	2.25	1.35	1.85	1.4	1.7	1.1	1.45	2.7
8	1.45	1.3	1.7	1.4	1.75	1.3	1.75	1.3	1.6	1.1	1.4	1.75
9	1.4	1.3	1.65	1.4	1.7	1.25	2.1	1.4	1.55	1.3	1.4	1.55
10	1.4	1.3	1.65	1.4	1.6	1.25	1.8	1.3	1.5	1.8	1.4	1.45
11	2.35	1.35	1.6	1.35	1.55	1.3	1.55	1.25	1.45	1.3	1.4	1.4
12	3.1	1.7	1.7	1.3	1.5	1.2	1.45	1.2	1.4	1.25	1.35	1.55
13	2.2	2.25	1.6	1.3	1.5	1.2	1.35	1.15	1.4	1.2	1.3	1.4
14	2.05	2.35	1.6	1.3	1.45	1.3	1.3	1.1	1.35	1.2	1.4	1.4
15	1.85	6.1	1.55	1.85	1.45	1.3	1.3	1.1	1.3	1.15	1.4	1.35
16	1.75	2.9	1.55	1.65	1.4	1.25	1.4	1.2	1.3	1.15	1.35	1.3
17	1.7	2.45	1.55	1.55	1.6	1.2	1.25	1.35	1.3	1.15	1.3	1.3
18	1.6	2.1	1.5	1.5	1.5	1.2	1.2	1.5	1.25	1.15	1.3	1.3
19	1.55	2.15	1.5	1.5	1.55	1.2	1.2	1.3	1.25	1.15	1.3	1.3
20	1.5	2.0	1.9	1.4	1.45	1.2	1.2	1.35	1.25	1.1	1.25	1.3
21	1.5	2.05	1.75	1.4	1.45	1.35	1.15	1.6	1.2	1.1	1.25	1.25
22	1.5	2.0	1.65	1.4	1.4	1.2	1.15	2.8	1.2	1.25	1.25	2.1
23	1.45	1.9	1.95	1.4	1.35	1.2	1.4	3.0	1.2	2.35	1.25	1.65
24	1.45	1.85	2.2	1.35	1.4	1.15	1.2	3.85	1.2	1.9	1.25	1.6
25	1.5	1.85	1.9	2.6	1.35	1.3	1.15	4.3	1.2	1.55	1.25	1.55
26	1.35	1.95	1.75	2.05	1.3	1.15	1.4	3.05	1.15	1.45	1.25	1.5
27	1.5	1.8	1.7	1.8	1.35	1.1	1.15	2.4	1.15	1.4	1.25	1.45
28	1.35	1.7	1.6	1.7	1.3	1.1	1.3	2.15	1.55	1.65	1.2	1.45
29	1.35	1.75	1.55	1.6	1.3	1.1	1.6	1.9	1.25	2.75	1.2	1.4
30	1.3	.....	1.55	1.7	1.4	1.05	1.5	1.8	1.2	2.3	1.2	1.45
31	1.3	.....	1.5	.....	1.3	.....	1.35	1.7	.....	2.0	.....	1.55

Rating table for South Fork of Mills River near Sitton, N. C., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	35	2.00	265	3.10	620	4.40	1,200
1.00	51	2.10	295	3.20	669	4.60	1,300
1.10	68	2.20	325	3.30	700	4.80	1,400
1.20	86	2.30	355	3.40	740	5.00	1,500
1.30	105	2.40	385	3.50	780	5.20	1,600
1.40	125	2.50	415	3.60	825	5.40	1,700
1.50	146	2.60	445	3.70	870	5.60	1,800
1.60	168	2.70	480	3.80	915	5.80	1,900
1.70	191	2.80	515	3.90	960	6.00	2,000
1.80	215	2.90	550	4.00	1,005	6.20	2,100
1.90	240	3.00	585	4.20	1,100		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon 10 discharge measurements made during 1906 and 1907, and is fairly well defined between gage heights 0.9 feet and 1.7 feet. Above gage height 2.2 feet the rating is the same as for 1906. Above gage height 4.1 feet the rating curve is a tangent, the difference being 50 per tenth.

Monthly discharge of South Fork of Mills River near Sitton, N. C., for 1907 and 1908.

[Drainage area, 40.5 square miles.]

Month.	Discharge in second-feet.			Per square mile.	Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.			
1907.						
January	265	105	139	3.43	3.95	C.
February	146	86	106	2.62	2.73	C.
March	295	86	113	2.79	3.22	C.
April	215	86	118	2.91	3.25	C.
May	445	105	165	4.07	4.69	C.
June	355	96	144	3.56	3.97	C.
July	125	68	92.5	2.28	2.63	C.
August	105	51	66.8	1.65	1.90	C.
September	1,050	35	92.2	2.28	2.54	C.
October	77	43	52.9	1.31	1.51	C.
November	400	51	108	2.67	2.98	C.
December	620	68	178	4.40	5.07	C.
The year	1,050	35	115	2.91	38.44	
1908.						
January	620	105	183	4.52	5.21	C.
February	2,050	105	285	7.04	7.59	C.
March	325	146	195	4.81	5.54	C.
April	445	105	157	3.88	4.33	C.
May	340	105	146	3.60	4.15	C.
June	115	60	90.8	2.24	2.50	C.
July	400	60	137	3.38	3.90	C.
August	1,150	68	235	5.80	6.69	C.
September	370	77	131	3.23	3.60	C.
October	498	68	137	3.38	3.90	C.
November	215	86	120	2.96	3.30	C.
December	480	86	143	3.53	4.07	C.
The year	2,050	60	163	4.03	54.78	

MUD CREEK AT NAPLES, N. C.

The station here, located at a wagon bridge one-half mile east of Naples, was established May 10, 1907, as one of the stations maintained in connection with the Forest Service investigations for the study of the water resources of the southern Appalachian Mountains.

The station was discontinued on December 31, 1907.[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Mud Creek at Naples, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 10	Warren E. Hall	33	79	2.41	188
July 17	do	32	50	1.78	88
Do	F. P. Thomas	32	51	1.78	94
August 17	Warren E. Hall	33	61	1.80	113
Do	do	33	60	1.80	112
September 18	do	29	39	1.51	68
Do	do	29	37	1.50	61
December 10	do	39	164	4.08	525
Do	do	39	164	4.10	522
1908.					
April 10	Warren E. Hall	35	92	2.42	214

Daily gage height, in feet, of Mud Creek at Naples, N. C., for 1907.

[Observer, W. F. Byers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						4.2	2.1	1.9	1.2	1.6	1.3	1.8
2						3.0	2.1	1.9	1.3	1.4	1.2	1.5
3						2.7	2.3	2.1	1.7	1.6	1.2	1.6
4						2.5	2.2	2.0	1.8	1.7	1.3	1.4
5						2.3	2.0	1.8	1.5	1.7	1.5	1.2
6						2.2	1.9	1.9	1.4	1.7	1.6	1.1
7						2.2	1.8	1.8	1.5	1.7	1.4	1.3
8						2.6	1.8	1.8	1.8	1.8	1.6	1.9
9						2.5	1.7	1.9	1.7	1.6	1.6	4.0
10					2.4	4.0	1.7	1.9	1.6	1.8	2.0	4.2
11					2.65	2.9	1.7	1.9	2.2	1.6	1.8	4.0
12					2.4	2.5	1.8	2.0	1.6	1.7	1.9	3.8
13					2.3	2.1	1.8	1.8	1.6	1.5	1.8	5.0
14					2.2	2.1	1.8	1.9	1.2	1.3	1.6	8.5
15					2.2	2.1	1.8	1.9	1.2	1.1	1.7	7.0
16					2.2	2.1	1.8	1.9	1.3	1.2	1.5	5.9
17					2.2	2.1	1.8	1.8	1.1	1.5	1.9	4.7
18					2.1	2.0	2.0	1.7	1.2	1.3	3.0	3.0
19					2.1	2.0	1.9	1.8	1.3	1.6	2.7	2.8
20					2.1	2.2	1.8	1.9	1.5	1.5	2.0	2.6
21					2.0	2.4	1.8	1.8	1.2	1.2	4.0	2.9
22					2.0	2.2	1.8	1.9	1.3	1.5	3.6	2.2
23					2.0	2.2	1.7	2.0	4.0	1.5	6.0	8.0
24					2.0	2.3	1.7	1.8	3.2	1.5	5.3	6.0
25					2.0	2.3	1.8	1.7	2.0	1.4	3.9	5.0
26					3.9	2.2	1.7	1.6	1.8	1.5	3.4	4.9
27					3.1	2.2	1.7	1.5	1.2	1.2	2.8	3.0
28					2.4	2.1	1.7	1.5	2.0	1.1	1.9	3.0
29					2.2	2.1	2.0	1.6	2.2	1.5	1.7	3.5
30					2.2	2.2	2.0	1.3	1.8	1.6	1.5	5.0
31					3.0		1.9	1.2		1.2		4.9

Daily discharge, in second-feet, of Mud Creek at Naples, N. C., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						550	136	106	37	72	45	94
2						310	136	106	45	53	37	62
3						250	172	136	82	72	37	72
4						210	154	120	94	82	45	53
5						172	120	94	62	82	62	37
6						154	106	106	53	82	72	30
7						154	94	94	62	82	53	45
8						230	94	94	94	94	72	106
9						210	82	106	82	72	72	510
10					190	510	82	106	72	94	120	550

Daily discharge, in second-feet, of Mud Creek at Naples, N. C., for 1907—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	.....	.....	.....	.....	240	290	82	106	154	72	94	510
12	.....	.....	.....	.....	190	210	94	120	72	82	106	470
13	.....	.....	.....	.....	172	136	94	94	72	62	94	710
14	.....	.....	.....	.....	154	136	94	106	37	45	72	1,410
15	.....	.....	.....	.....	154	136	94	106	37	30	82	1,110
16	.....	.....	.....	.....	154	136	94	106	45	37	62	890
17	.....	.....	.....	.....	154	136	94	94	30	62	106	650
18	.....	.....	.....	.....	136	120	120	82	37	45	310	310
19	.....	.....	.....	.....	136	120	106	94	45	72	250	270
20	.....	.....	.....	.....	136	154	94	106	62	62	120	230
21	.....	.....	.....	.....	120	190	94	94	37	37	510	290
22	.....	.....	.....	.....	120	154	94	106	45	62	430	154
23	.....	.....	.....	.....	120	154	82	120	510	62	910	1,310
24	.....	.....	.....	.....	120	172	82	94	350	62	770	910
25	.....	.....	.....	.....	120	172	94	82	120	53	490	710
26	.....	.....	.....	.....	490	154	82	72	94	62	390	690
27	.....	.....	.....	.....	330	154	82	62	37	37	270	310
28	.....	.....	.....	.....	190	136	82	62	120	30	106	310
29	.....	.....	.....	.....	154	136	120	72	154	62	82	410
30	.....	.....	.....	.....	154	154	120	45	94	72	62	710
31	.....	.....	.....	.....	310	.....	106	37	.....	37	.....	690

NOTE.—The above daily discharges are based on a fairly well-defined rating.

SWANNANOA RIVER AT SWANNANOA, N. C.

This station is located at the iron highway bridge one-fourth mile from the railroad station at Swannanoa. It was established May 28, 1907, in connection with the special investigations of water resources and power possibilities in the southern Appalachian Mountains. The station is about 2 miles below the North Fork of the river and the same distance above Beetree Creek.

The discharge measurements are made from the highway bridge, where the bank, river bed, current, and other conditions are fairly good.[a]

Discharge measurements of Swannanoa River at Swannanoa, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 28	Warren E. Hall	54	112	1.65	84
July 12	do	54	127	1.91	134
Do	F. P. Thomas	54	128	1.89	130
August 17	B. M. Hall, jr	50	100	1.36	47
Do	do	50	103	1.37	52
Do	do	50	107	1.37	50
September 25	Warren E. Hall	49	109	1.48	66
Do	do	49	109	1.47	63
December 11	do	55	111	1.87	107
December 12	do	55	106	1.76	92
1908.					
April 21	Warren E. Hall	57	114	1.90	109
March 19	do	60	135	2.27	196
July 21	F. P. Thomas	50	89	1.51	58
Do	do	50	90	1.49	56

[a] Records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Swannanoa River at Swannanoa, N. C., for 1907 and 1908.

[Observer, W. D. Patton.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	2.5	2.1	1.6	1.1	1.4	1.2	1.5
2	.....	.....	.....	.....	.....	2.4	2.0	1.5	1.1	1.4	1.1	1.4
3	.....	.....	.....	.....	.....	2.7	1.9	1.5	1.3	1.4	1.1	1.4
4	.....	.....	.....	.....	.....	2.5	2.1	1.5	1.3	1.4	1.1	1.4
5	.....	.....	.....	.....	.....	2.2	1.9	1.5	1.2	1.4	1.2	1.4
6	.....	.....	.....	.....	.....	2.0	1.8	1.5	1.2	1.4	1.2	1.4
7	.....	.....	.....	.....	.....	2.0	1.8	1.4	1.3	1.4	1.3	1.4
8	.....	.....	.....	.....	.....	2.1	1.7	1.7	1.3	1.3	1.3	1.5
9	.....	.....	.....	.....	.....	2.1	1.7	1.5	1.2	1.3	1.3	1.5
10	.....	.....	.....	.....	.....	2.0	1.7	1.5	1.4	1.3	1.4	2.7
11	.....	.....	.....	.....	.....	2.0	1.7	1.5	1.4	1.2	1.4	2.0
12	.....	.....	.....	.....	.....	1.9	1.9	1.6	1.3	1.2	1.4	1.8
13	.....	.....	.....	.....	.....	1.9	1.9	1.5	1.2	1.2	1.4	1.7
14	.....	.....	.....	.....	.....	1.9	1.7	1.4	1.2	1.2	1.4	2.7
15	.....	.....	.....	.....	.....	1.8	1.8	1.5	1.2	1.2	1.4	2.6
16	.....	.....	.....	.....	.....	1.8	1.9	1.4	1.2	1.2	1.4	2.5
17	.....	.....	.....	.....	.....	1.7	3.45	1.4	1.2	1.2	1.5	1.9
18	.....	.....	.....	.....	.....	1.7	2.5	1.7	1.2	1.2	1.5	1.7
19	.....	.....	.....	.....	.....	1.7	2.1	1.5	1.2	1.2	1.5	1.6
20	.....	.....	.....	.....	.....	1.6	2.0	1.5	1.1	1.2	1.5	1.6
21	.....	.....	.....	.....	.....	1.8	2.0	1.4	1.1	1.2	1.8	1.6
22	.....	.....	.....	.....	.....	1.9	1.8	1.4	1.1	1.1	1.9	1.6
23	.....	.....	.....	.....	.....	2.4	1.8	1.4	4.8	1.1	1.95	3.0
24	.....	.....	.....	.....	.....	2.2	1.8	1.5	1.9	1.1	2.0	2.9
25	.....	.....	.....	.....	.....	2.2	1.7	1.4	1.5	1.2	1.9	2.8
26	.....	.....	.....	.....	.....	2.6	1.6	1.4	1.4	1.2	1.9	2.7
27	.....	.....	.....	.....	.....	2.45	1.6	1.3	1.3	1.2	1.8	2.6
28	.....	.....	.....	.....	1.7	2.7	1.6	1.2	1.5	1.3	1.8	1.8
29	.....	.....	.....	.....	1.6	2.5	1.6	1.2	1.4	1.3	1.7	1.8
30	.....	.....	.....	.....	1.6	2.3	2.0	1.1	1.4	1.2	1.5	3.05
31	.....	.....	.....	.....	1.7	.....	2.7	1.2	.....	1.2	.....	3.0
1908.												
1	2.0	1.7	2.1	2.0	2.0	2.0	1.4	1.7	2.1	1.5	2.5	1.8
2	1.9	1.7	2.1	2.0	2.0	2.0	1.4	1.7	2.0	1.5	2.4	1.8
3	1.9	1.7	2.1	1.9	1.9	1.9	1.7	1.6	1.9	1.5	2.4	1.8
4	1.9	1.7	2.0	1.9	1.9	1.8	1.7	1.9	1.9	1.4	2.3	1.7
5	2.1	1.7	2.1	1.9	1.9	1.8	1.9	1.9	3.1	1.4	2.3	1.7
6	1.9	1.8	2.1	1.9	1.9	1.9	2.45	1.9	3.6	1.4	2.1	1.7
7	1.9	1.7	2.2	1.9	2.4	1.9	2.1	1.9	2.3	1.4	2.1	2.5
8	1.9	1.7	2.1	1.8	2.0	1.8	2.5	1.8	2.1	1.4	2.0	2.2
9	1.8	1.7	2.1	1.8	2.0	1.8	2.3	2.1	2.0	2.8	2.0	2.0
10	1.8	1.7	2.1	1.8	2.0	1.8	2.0	1.9	2.0	3.0	1.9	1.9
11	2.3	2.0	2.2	1.8	1.9	1.8	1.9	1.8	1.9	2.8	1.9	1.9
12	3.8	2.4	2.5	1.8	1.9	1.8	1.8	1.8	1.9	2.0	1.9	2.0
13	3.8	2.9	2.3	1.7	1.8	1.7	1.8	1.7	1.8	1.8	2.0	2.0
14	3.6	3.0	2.2	1.7	1.8	1.7	1.9	1.7	1.6	1.8	2.4	1.9
15	4.3	7.8	2.1	1.9	1.8	1.7	1.9	1.6	1.5	1.7	2.1	1.9
16	2.2	4.0	2.1	2.2	1.7	1.6	1.7	1.7	1.5	1.6	2.0	1.8
17	2.1	3.8	2.1	2.1	2.0	1.6	1.6	1.7	1.6	1.6	1.9	1.8
18	2.1	3.6	2.1	2.1	1.8	1.6	1.5	1.7	1.6	1.6	1.9	1.8
19	1.9	3.6	2.0	2.0	2.5	1.6	1.5	1.7	1.7	1.6	1.9	1.8
20	1.9	3.4	2.2	2.0	2.1	1.6	1.5	1.7	1.6	1.6	1.9	1.8
21	1.9	3.0	2.2	1.9	1.9	1.6	1.5	1.6	1.6	1.6	1.8	1.8
22	1.9	2.8	2.2	1.9	1.9	1.6	1.5	2.0	1.6	1.6	1.8	2.5
23	1.9	2.4	3.0	1.9	1.9	1.6	2.0	2.2	1.5	6.7	1.8	2.4
24	1.8	2.1	3.5	1.8	1.9	1.5	1.7	4.4	1.6	3.9	1.8	2.3
25	1.8	2.1	2.7	3.4	1.9	1.5	1.7	4.2	1.6	3.8	1.8	2.1
26	1.8	2.0	2.5	2.7	1.9	1.5	1.6	3.6	1.5	3.7	1.7	2.0
27	1.8	2.1	2.3	2.4	2.2	1.5	1.6	3.0	1.5	3.4	1.7	2.0
28	1.8	2.1	2.3	2.3	2.2	1.5	1.6	2.8	1.5	2.8	1.7	2.0
29	1.7	2.1	2.2	2.2	2.3	1.4	1.8	2.4	1.5	3.8	1.7	2.0
30	1.7	.....	2.1	2.1	2.3	1.4	2.1	2.2	1.4	3.0	1.7	2.3
31	1.7	.....	2.0	.....	2.1	.....	1.9	2.1	.....	2.9	.....	2.3

Daily discharge, in second-feet, of Swannanoa River at Swananoa, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	250	158	74	30	52	36	62
2	.....	.....	.....	.....	.....	226	138	62	30	52	30	52
3	.....	.....	.....	.....	.....	300	120	62	44	52	30	52
4	.....	.....	.....	.....	.....	250	158	62	44	52	30	52
5	.....	.....	.....	.....	.....	180	120	62	36	52	36	52
6	.....	.....	.....	.....	.....	138	102	62	36	52	36	52
7	.....	.....	.....	.....	.....	138	102	52	44	52	44	52
8	.....	.....	.....	.....	.....	158	88	88	44	44	44	62
9	.....	.....	.....	.....	.....	158	88	62	36	44	44	62
10	.....	.....	.....	.....	.....	138	88	62	52	44	52	300
11	.....	.....	.....	.....	.....	138	88	62	52	36	52	138
12	.....	.....	.....	.....	.....	120	120	74	44	36	52	102
13	.....	.....	.....	.....	.....	120	120	62	36	36	52	88
14	.....	.....	.....	.....	.....	120	88	52	36	36	52	300
15	.....	.....	.....	.....	.....	102	102	62	36	36	52	275
16	.....	.....	.....	.....	.....	102	120	52	36	36	52	250
17	.....	.....	.....	.....	.....	88	.....	52	36	36	62	120
18	.....	.....	.....	.....	.....	88	250	88	36	36	62	88
19	.....	.....	.....	.....	.....	88	158	62	36	36	62	74
20	.....	.....	.....	.....	.....	74	138	62	30	36	62	74
21	.....	.....	.....	.....	.....	102	138	52	30	36	102	74
22	.....	.....	.....	.....	.....	120	102	52	30	30	120	74
23	.....	.....	.....	.....	.....	226	102	52	.....	30	129	390
24	.....	.....	.....	.....	.....	180	102	62	120	30	138	360
25	.....	.....	.....	.....	.....	180	88	52	62	36	120	330
26	.....	.....	.....	.....	.....	275	74	52	52	36	120	300
27	.....	.....	.....	.....	.....	238	74	44	44	36	102	275
28	.....	.....	.....	.....	88	300	74	36	62	44	102	102
29	.....	.....	.....	.....	74	250	74	36	52	44	88	102
30	.....	.....	.....	.....	74	202	138	30	52	36	62	405
31	.....	.....	.....	.....	88	.....	300	36	.....	36	.....	390
1908.												
1	138	88	158	138	138	138	52	88	158	62	250	102
2	120	88	158	138	138	138	52	88	138	62	226	102
3	120	88	158	120	120	120	88	74	120	62	226	102
4	120	88	138	120	120	102	88	120	120	52	202	88
5	158	88	158	120	120	102	120	120	.....	52	202	88
6	120	102	158	120	120	120	238	120	.....	52	158	88
7	120	88	180	120	226	120	158	120	202	52	158	250
8	120	88	158	102	138	102	250	102	158	52	138	180
9	102	88	158	102	138	102	202	158	138	330	138	138
10	102	88	158	102	138	102	138	120	138	390	120	120
11	202	138	180	102	120	102	120	102	120	330	120	120
12	.....	226	250	102	120	102	102	102	120	138	120	138
13	.....	360	202	88	102	88	102	88	102	102	138	138
14	.....	390	180	88	102	88	120	88	74	102	226	120
15	.....	.....	158	120	102	88	120	74	62	88	158	120
16	180	.....	158	180	88	74	88	88	62	74	138	102
17	158	.....	158	158	138	74	74	88	74	74	120	102
18	158	.....	158	158	102	74	62	88	74	74	120	102
19	120	.....	138	138	250	74	62	88	88	74	120	102
20	120	.....	180	138	158	74	62	88	74	74	120	102
21	120	390	180	120	120	74	62	74	74	74	102	102
22	120	330	180	120	120	74	62	138	74	74	102	250
23	120	226	390	120	120	74	138	180	62	.....	102	226
24	102	158	.....	102	120	62	88	.....	74	.....	102	202
25	102	158	300	.....	120	62	88	.....	74	.....	102	158
26	102	138	250	300	120	62	74	.....	62	.....	88	138
27	102	158	202	226	180	62	74	390	62	.....	88	138
28	102	158	202	202	180	62	74	330	62	330	88	138
29	88	158	180	180	202	52	102	226	62	.....	88	138
30	88	.....	158	158	202	52	158	180	52	390	88	202
31	88	.....	138	.....	158	.....	120	158	.....	360	.....	202

NOTE.—Daily discharge for 1907 and 1908 based on a rating curve which is well defined between gage heights 1.3 feet and 2.5 feet. Beginning May 28, 1907, the discharge was greater than 400 second-feet for all missing days.

IVY RIVER AT DEMOCRAT, N. C.

Ivy River rises on the western slopes of the Great Craggy Mountains, near Yeates Knob, the headwaters being at an elevation of about 5,000 feet above sea level, and flows in a general westerly direction, joining the French Broad about 2½ miles above Marshall. Its drainage area comprises about 164 square miles.

The gaging station, which is located at Democrat, about 18 miles west of Asheville, N. C., was established May 26, 1907, in connection with the study of the water resources of the Southern Appalachian Mountains. The station is about 4 miles above West Fork.

The banks are high and the bed is rocky and rough. The current is irregular and the flow is disturbed by a mill above.

The station was abandoned at the end of 1907.[a]

Discharge measurements of Ivy River at Democrat, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 27	Warren E. Hall	60	114	1.00	81
July 11	do	55	87	.89	58
Do	F. P. Thomas	55	87	.89	51
September 24	Warren E. Hall	55	94	1.00	64

Daily gage height, in feet, of Ivy River at Democrat, N. C., for 1907.

[Observer, W. R. Maney.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1						1.7	1.3	1.0	0.7	0.8	0.7	0.8
2						1.1	1.2	1.0	.7	.8	.8	.8
3						1.5	1.1	.9	.7	.8	.9	.8
4						1.3	1.1	.9	.7	.8	.8	.8
5						1.2	1.0	.9	.8	1.0	.8	.8
6						1.1	1.0	.9	.7	.8	.8	.7
7						1.1	1.0	.9	.7	.8	.8	.7
8						1.2	1.0	.9	.9	.8	.8	.8
9						1.4	1.0	.9	.8	.8	.8	1.0
10						1.2	.9	.9	.8	.7	1.0	1.7
11						1.3	.9	.8	.9	.7	1.0	1.3
12						1.3	1.2	.9	.7	.7	.9	1.0
13						1.2	1.2	1.0	.7	.7	.9	1.0
14						1.2	1.1	.9	.6	.7	.9	1.7
15						1.2	1.0	.9	.7	.7	.8	1.3
16						1.1	1.1	.8	.9	.7	.8	1.2
17						1.1	1.1	.8	.7	.7	.8	1.0
18						1.0	1.5	1.1	.7	.7	1.0	1.0
19						1.0	1.3	1.0	.7	.8	.9	1.0
20						1.2	1.2	1.0	.6	.7	.9	1.0
21						1.1	1.1	.9	.6	.7	1.1	1.0
22						1.0	1.0	.8	.8	.7	1.0	1.0
23						1.1	1.0	.8	3.8	.8	1.1	1.7
24						1.2	1.1	.9	1.1	.8	1.3	1.4
25						1.2	1.1	.8	1.0	.8	1.0	1.2
26						1.3	1.0	.8	.8	.7	1.0	1.1
27					1.0	1.2	1.0	.7	.8	.8	1.0	1.1
28					1.0	1.3	1.0	.7	.8	.9	1.0	1.1
29					.9	1.6	1.0	.8	1.0	.9	.9	1.1
30					.9	1.4	1.3	.8	.8	.8	.9	1.9
31					1.0		1.1	.9		.8		1.4

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily discharge, in second-feet, of Ivy River at Democrat, N. C., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	.....	.....	.....	.....	70	32	43	32	43
2	.....	.....	.....	.....	.....	.....	.....	70	32	43	43	43
3	.....	.....	.....	.....	.....	.....	88	55	32	43	55	43
4	.....	.....	.....	.....	.....	.....	88	55	32	43	43	43
5	.....	.....	.....	.....	.....	.....	70	55	43	70	43	43
6	.....	.....	.....	.....	.....	88	70	55	32	43	43	32
7	.....	.....	.....	.....	.....	88	70	55	32	43	43	32
8	.....	.....	.....	.....	.....	.....	70	55	55	43	43	43
9	.....	.....	.....	.....	.....	.....	70	55	43	43	43	70
10	.....	.....	.....	.....	.....	.....	55	55	43	32	70	.....
11	.....	.....	.....	.....	.....	.....	55	43	55	32	70	.....
12	.....	.....	.....	.....	.....	.....	.....	55	32	32	55	70
13	.....	.....	.....	.....	.....	.....	.....	70	32	32	55	70
14	.....	.....	.....	.....	.....	.....	88	55	.....	32	55	.....
15	.....	.....	.....	.....	.....	.....	70	55	32	32	43	.....
16	.....	.....	.....	.....	.....	88	88	43	55	32	43	.....
17	.....	.....	.....	.....	.....	88	88	43	32	32	43	70
18	.....	.....	.....	.....	.....	70	.....	88	32	32	70	70
19	.....	.....	.....	.....	.....	70	.....	70	32	43	55	70
20	.....	.....	.....	.....	.....	.....	.....	70	.....	32	55	70
21	.....	.....	.....	.....	.....	88	88	55	.....	32	88	70
22	.....	.....	.....	.....	.....	70	70	43	43	32	70	70
23	.....	.....	.....	.....	.....	88	70	43	.....	43	88	.....
24	.....	.....	.....	.....	.....	.....	88	55	88	43	.....	.....
25	.....	.....	.....	.....	.....	.....	88	43	70	43	70	.....
26	.....	.....	.....	.....	.....	.....	70	43	43	32	70	88
27	.....	.....	.....	.....	70	.....	70	32	43	43	70	88
28	.....	.....	.....	.....	70	.....	70	32	43	55	70	88
29	.....	.....	.....	.....	55	.....	70	43	70	55	55	88
30	.....	.....	.....	.....	55	.....	.....	43	43	43	55	.....
31	.....	.....	.....	.....	70	.....	88	55	.....	43	.....	.....

NOTE.—The above daily discharges are based on an approximate rating curve. Beginning June 5 the discharge was greater than 90 second-feet for all missing days.

PIGEON RIVER AT CANTON, N. C.

Pigeon River rises among the Balsam and Pisgah mountains, cuts its way through the Unaka Mountains, and joins French Broad River on the Tennessee Plain. It drains an interior agricultural basin which is oval in outline, the longer axis northwest, parallel to the general course of the stream, and almost entirely within the Appalachian Mountain region. It is circumscribed by lofty mountains, with many peaks more than 6,000 feet in altitude. Many minor ranges springing from the surrounding mountains converge toward the middle of the basin, dividing it into deep, narrow valleys, except near its upper end, between the towns of Canton and Waynesville, where there is a broad open valley of alluvial plains and rolling hills, dotted with low mountains.

The basin has an area of about 667 square miles.

The soils are loams and sandy loams, mostly fine grained, derived from gneiss and schists, though in the mountains they are more siliceous and coarser, being the product of metamorphosed sandstones, quartzites, and conglomerates.

The gaging station, which is located at the wagon bridge about 1,000 feet above the railroad bridge of the Southern Railway at

Canton, N. C., was established May 25, 1907, in cooperation with the Forest Service for the purpose of studying the water resources and power possibilities of the southern Appalachian Mountains.

Discharge measurements are made from the single span highway bridge, where the flow is confined between the bridge abutments. The current is rather sluggish and at low stages is possibly affected by a low dam about one-fourth of a mile below.[a]

Discharge measurements of Pigeon River at Canton, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 25	F. A. Murray	129	298	3.07	274
August 24	F. P. Thomas	119	240	2.60	141
Do	do	119	247	2.58	144
October 22	O. P. Hall	110	261	2.50	105
1908.					
April 14	Warren E. Hall	129	419	3.05	246
July 23	F. P. Thomas	130	381	2.88	186

Daily gage height, in feet, of Pigeon River at Canton, N. C., for 1907 and 1908.

[Observer, J. D. Holtsclaw.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.5	2.9	2.6	2.5	2.8	2.6	2.9
2						3.2	3.05	2.6	2.5	2.8	2.65	2.85
3						3.2	3.1	2.6	2.5	2.75	2.8	2.8
4						3.1	2.9	2.6	2.5	2.7	2.7	2.8
5						3.05	2.8	2.6	2.5	2.7	2.6	2.7
6						3.0	2.8	2.6	2.5	2.7	2.6	2.7
7						3.0	2.8	2.6	2.5	2.7	2.6	2.7
8						3.35	2.8	2.6	2.65	2.7	2.6	2.7
9						3.2	2.7	2.6	2.6	2.6	2.65	2.9
10						3.15	2.7	2.6	2.5	2.6	3.05	3.85
11						3.05	2.7	2.6	2.5	2.6	2.85	3.2
12						3.0	3.05	2.75	2.5	2.55	2.75	3.1
13						3.0	2.9	2.65	2.5	2.5	2.6	3.05
14						3.0	2.9	2.6	2.5	2.5	2.6	3.1
15						3.0	3.0	2.6	2.5	2.5	2.6	3.4
16						2.9	3.2	2.7	2.5	2.5	2.6	3.25
17						2.9	2.9	2.65	2.5	2.5	2.6	3.2
18						2.9	3.0	2.6	2.5	2.5	2.6	3.15
19						2.9	2.95	2.6	2.5	2.5	2.75	3.05
20						2.9	2.9	2.6	2.5	2.5	2.8	3.0
21						2.9	2.8	2.6	2.6	2.5	3.85	3.0
22						2.9	2.7	2.6	2.75	2.5	3.2	3.0
23						3.0	2.7	2.7	6.1	2.5	3.25	4.8
24						3.15	2.75	2.65	3.15	2.5	3.6	3.65
25					3.1	3.0	2.8	2.6	2.85	2.5	3.4	3.5
26					3.15	2.9	2.7	2.5	2.75	2.5	3.2	3.4
27					3.05	2.95	2.7	2.5	2.7	2.5	3.0	3.25
28					3.0	3.1	2.7	2.5	2.9	2.7	2.9	3.2
29					3.0	3.0	2.7	2.5	3.2	2.65	2.9	3.2
30					3.0	2.9	2.7	2.5	2.85	2.6	2.9	4.0
31					3.2		2.7	2.5		2.6		4.1

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled, "Water powers of North Carolina."

Daily gage height, in feet, of Pigeon River at Canton, N. C., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	3.8	3.25	3.3	3.3	3.4	3.0	2.9	2.8	3.2	2.8	3.9	3.1
2	3.6	3.2	3.3	3.25	3.4	3.0	2.9	2.8	3.2	2.8	3.8	3.1
3	3.3	3.2	3.3	3.2	3.4	3.0	2.95	2.8	3.15	2.8	3.75	3.1
4	3.4	3.25	3.35	3.2	3.4	3.0	3.1	2.9	3.1	2.8	3.65	3.1
5	3.6	3.3	3.4	3.2	3.35	3.1	3.65	3.05	3.7	2.7	3.55	3.1
6	3.4	3.2	3.5	3.2	3.3	3.15	3.4	3.5	3.5	2.7	3.45	3.1
7	3.4	3.1	3.5	3.15	3.65	3.2	3.55	3.3	3.4	2.65	3.4	4.8
8	3.35	3.1	3.45	3.1	3.6	3.1	3.55	3.0	3.35	2.6	3.4	3.95
9	3.3	3.1	3.35	3.1	3.5	3.1	3.45	2.8	3.3	3.2	3.35	3.55
10	3.3	3.1	3.3	3.05	3.4	3.1	3.35	2.8	3.2	4.0	3.3	3.45
11	4.5	3.35	3.3	3.0	3.4	3.1	3.25	2.8	3.1	3.2	3.3	3.4
12	4.6	3.75	3.8	3.0	3.35	3.0	3.15	2.9	3.0	3.2	3.2	3.65
13	3.9	3.95	3.4	3.0	3.3	3.0	3.1	2.9	3.0	3.1	3.2	3.55
14	3.7	4.3	3.35	3.0	3.3	3.0	3.1	2.9	3.0	3.1	3.25	3.5
15	3.55	7.7	3.3	3.25	3.25	3.3	3.1	2.9	3.0	3.05	3.4	3.4
16	3.5	4.4	3.3	3.45	3.2	3.15	3.05	2.9	3.0	3.0	3.4	3.4
17	3.45	4.1	3.3	3.45	3.2	3.1	3.0	2.9	2.9	3.0	3.3	3.3
18	3.4	3.9	3.3	3.4	3.2	3.05	2.9	2.95	2.9	3.0	3.3	3.3
19	3.3	3.7	3.3	3.35	3.2	3.0	3.05	3.05	2.9	3.0	3.2	3.3
20	3.3	3.55	3.95	3.3	3.2	3.3	2.9	3.15	2.9	2.9	3.2	3.3
21	3.25	3.5	3.7	3.2	3.1	3.0	2.9	3.6	2.9	2.9	3.2	3.3
22	3.2	3.45	3.5	3.2	3.1	3.0	2.85	3.95	2.8	2.95	3.2	3.3
23	3.1	3.4	4.2	3.2	3.1	3.0	2.8	3.35	2.8	5.0	3.2	3.9
24	3.1	3.4	4.1	3.2	3.1	3.0	2.8	3.4	2.8	4.0	3.2	3.6
25	3.1	3.4	3.8	5.2	3.1	2.9	2.85	4.9	2.8	3.7	3.1	3.45
26	3.1	3.4	3.65	3.85	3.1	2.9	3.05	4.4	2.8	3.65	3.1	3.4
27	3.25	3.3	3.6	3.75	3.0	2.9	2.9	3.8	2.8	3.6	3.1	3.4
28	3.1	3.3	3.55	3.65	3.0	2.9	3.15	3.65	2.8	3.95	3.1	3.35
29	3.1	3.3	3.5	3.5	3.0	2.9	3.05	3.5	2.8	4.6	3.1	3.3
30	3.1	.....	3.4	3.45	3.0	2.9	2.95	3.35	2.8	4.1	3.1	3.45
31	3.3	.....	3.35	.....	3.0	.....	2.9	3.3	.....	3.95	.....	3.45

Daily discharge, in second-feet, of Pigeon River at Canton, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	205	125	105	175	125	205
2	.....	.....	.....	.....	.....	300	250	125	105	175	138	190
3	.....	.....	.....	.....	.....	300	265	125	105	162	175	175
4	.....	.....	.....	.....	.....	265	205	125	105	150	150	175
5	.....	.....	.....	.....	.....	250	175	125	105	150	125	150
6	.....	.....	.....	.....	.....	235	175	125	105	150	125	150
7	.....	.....	.....	.....	.....	235	175	125	105	150	125	150
8	.....	.....	.....	.....	.....	.....	175	125	138	150	125	150
9	.....	.....	.....	.....	.....	300	150	125	125	125	138	205
10	.....	.....	.....	.....	.....	282	150	125	105	125	250	.....
11	.....	.....	.....	.....	.....	250	150	125	105	125	190	300
12	.....	.....	.....	.....	.....	235	250	162	105	115	162	265
13	.....	.....	.....	.....	.....	235	205	138	105	105	125	250
14	.....	.....	.....	.....	.....	235	205	125	105	105	125	265
15	.....	.....	.....	.....	.....	235	235	125	105	105	125	.....
16	.....	.....	.....	.....	.....	205	300	150	105	105	125	.....
17	.....	.....	.....	.....	.....	205	205	138	105	105	125	300
18	.....	.....	.....	.....	.....	205	235	125	105	105	125	282
19	.....	.....	.....	.....	.....	205	220	125	105	105	162	250
20	.....	.....	.....	.....	.....	205	205	125	105	105	175	235
21	.....	.....	.....	.....	.....	205	175	125	125	105	.....	235
22	.....	.....	.....	.....	.....	205	150	125	162	105	300	235
23	.....	.....	.....	.....	.....	235	150	150	.....	105	.....	.....
24	.....	.....	.....	.....	.....	282	162	138	282	105	.....	.....
25	.....	.....	.....	.....	265	235	175	125	190	105	.....	.....
26	.....	.....	.....	.....	282	205	150	105	162	105	300	.....
27	.....	.....	.....	.....	250	220	150	105	150	105	235	.....
28	.....	.....	.....	.....	235	265	150	105	205	150	205	300
29	.....	.....	.....	.....	235	235	150	105	300	138	205	300
30	.....	.....	.....	.....	235	205	150	105	190	125	205	.....
31	.....	.....	.....	.....	300	.....	150	105	.....	125	.....	.....

(See note at foot of table on next page.)

Daily discharge, in second feet, of Pigeon River at Canton, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1						235	205	175	300	175		265
2		300				235	205	175	300	175		265
3		300		300		235	220	175	282	175		265
4				300		235	265	205	265	175		265
5				300		265		250		150		265
6		300		300		282				150		265
7		265		282		300				138		
8		265		265		265		235		125		
9		265		265		265		175		300		
10		265		250		265		175	300			
11				235		265		175	265	300		
12				235		235	282	205	235	300	300	
13				235		235	265	205	235	265	300	
14				235		235	265	205	235	265		
15							265	205	235	250		
16					300	282	250	205	235	235		
17					300	265	235	205	205	235		
18					300	250	205	220	205	235		
19					300	235	250	250	205	235	300	
20					300		205	282	205	205	300	
21				300	265	235	205		205	205	300	
22	300			300	265	235	190		175	220	300	
23	265			300	265	235	175		175		300	
24	265			300	265	235	175		175		300	
25	265				265	205	190		175		265	
26	265				265	205	250		175		265	
27					235	205	205		175		265	
28	265				235	205	282		175		265	
29	265				235	205	250		175		265	
30	265				235	205	220		175		265	
31					235		205					

NOTE.—Daily discharge 1907 and 1908 based on a well-defined rating curve. Beginning May 25, 1907, the discharge was greater than 320 second-feet on all missing days.

PIGEON RIVER AT NEWPORT, TENN.

This station is located at the highway bridge in the eastern part of Newport, 1 mile from the railroad station and 300 feet above the railroad bridge of the Southern Railway.

The station was originally established September 4, 1900, but as the gage was damaged a number of times the records were not continuous until after December 14, 1902. The station was discontinued on December 31, 1905, but on December 1, 1906, the United States Weather Bureau began reading the gage and since that time has furnished the gage heights to the United States Geological Survey. The chain gage formerly used by the Geological Survey is the one now used by the Weather Bureau, and the datum has remained the same.

The section at the station is rather poor for discharge measurements, and a water power on the river 1 mile below the station would possibly affect the low water flow in case the pond should be considerably lowered.[a]

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey, and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Pigeon River at Newport, Tenn., in 1906 and 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1906. May 24	O. P. Hall	186	608	1.34	663
1907. August 16	Warren E. Hall	137	942	1.54	696

Daily gage height, in feet, of Pigeon River at Newport, Tenn., for 1906 to 1908.

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.
1906.		1906.		1906.		1906.	
1	1.8	9	1.7	17	1.7	25	1.8
2	1.7	10	1.7	18	2.8	26	1.8
3	1.9	11	2.0	19	2.1	27	1.9
4	1.8	12	1.9	20	2.2	28	3.4
5	1.8	13	1.8	21	2.2	29	3.2
6	1.8	14	1.7	22	2.1	30	3.6
7	2.0	15	1.7	23	2.0	31	3.0
8	1.8	16	1.7	24	1.8		

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.0	1.6	1.7	2.1	2.0	1.9	1.8	1.4	0.9	.....	.....	1.6
2	2.5	2.0	1.9	1.8	1.9	2.2	1.6	.....	.9	.....	.....	1.5
3	2.4	1.9	2.4	1.7	2.1	1.9	2.0	.....	2.6	.....	.....	1.4
4	2.3	1.7	2.1	1.7	3.0	1.8	1.8	1.4	.9	.....	.....	1.3
5	2.2	2.6	1.9	1.6	2.6	1.7	1.7	1.3	.9	.....	.....	1.3
6	2.0	2.3	1.8	1.8	2.3	1.6	1.8	1.1	1.0	.....	.....	1.2
7	2.1	2.0	1.5	1.9	3.2	1.5	1.6	1.0	1.0	.....	1.2	1.2
8	2.0	1.9	2.4	1.8	2.9	3.4	1.4	1.1	1.3	.....	1.1	1.4
9	2.0	1.9	2.2	2.1	2.7	2.8	1.4	1.3	1.3	.....	1.0	1.5
10	2.0	1.8	2.3	1.8	2.5	2.2	1.3	1.6	1.0	.....	1.5	1.7
11	1.9	1.7	2.8	1.9	2.4	2.4	1.4	1.6	1.2	.....	2.2	2.5
12	1.9	1.7	2.4	1.8	2.4	2.0	1.4	1.3	1.4	.....	1.7	1.9
13	1.9	1.6	2.2	1.8	2.3	1.9	2.0	1.2	1.1	.....	1.6	1.7
14	1.8	1.6	2.3	1.7	2.2	1.9	1.8	1.2	1.0	.....	1.5	1.9
15	1.7	1.6	2.6	1.7	2.1	1.8	1.6	1.1	.9	.....	1.4	2.3
16	1.7	1.6	2.4	1.7	2.1	1.7	1.9	1.0	.8	.....	1.3	2.2
17	1.7	1.6	2.3	1.8	2.0	1.6	1.7	1.4	.....	.....	1.3	2.0
18	1.8	1.5	2.2	1.7	1.9	1.5	1.9	1.8	.....	.....	1.4	2.0
19	1.6	1.3	2.0	2.1	1.8	1.5	1.7	1.3	.....	.....	1.9	1.8
20	1.7	1.5	1.9	2.4	1.7	1.6	1.7	1.2	.....	.....	1.8	1.7
21	1.8	1.6	1.9	2.2	1.7	1.6	1.6	1.2	.....	.....	1.9	1.6
22	1.5	1.5	1.8	2.0	1.7	1.5	1.4	1.3	.....	.....	2.2	1.7
23	1.5	1.4	1.7	2.3	1.7	1.5	1.4	1.3	.....	.....	2.1	1.8
24	1.5	1.6	1.7	2.3	1.8	1.8	1.3	1.5	.....	.....	3.9	2.6
25	1.5	1.8	1.6	2.1	1.7	1.9	1.5	1.8	.....	.....	2.7	2.0
26	1.6	1.7	1.7	2.0	1.7	1.7	1.3	1.5	.....	.....	2.3	2.0
27	1.6	1.9	1.9	2.2	1.8	1.6	1.3	1.1	.....	.....	2.0	1.9
28	1.6	1.7	1.7	2.0	1.6	2.0	1.3	1.0	.....	.....	1.8	1.8
29	1.5	.....	1.6	2.2	1.6	3.7	1.2	1.2	.....	.....	1.7	1.9
30	1.5	.....	1.5	2.0	1.6	2.0	1.8	1.1	.....	.....	1.6	2.4
31	1.5	.....	1.8	.....	1.5	.....	1.4	.9	.....	.....	.....	3.5
1908.												
1	3.0	3.0	2.0	3.2	2.4	1.7	1.3	1.3	1.6	1.0	2.4	1.6
2	2.5	2.5	2.5	2.2	2.2	1.6	1.4	1.2	1.5	1.0	2.1	2.1
3	2.3	2.2	2.6	2.2	2.1	1.5	1.5	1.2	1.4	.9	2.0	1.6
4	2.0	2.0	2.5	2.1	2.0	1.8	1.4	1.5	1.3	.9	1.9	1.5
5	4.3	2.4	2.4	2.0	2.0	1.7	1.8	1.5	1.3	.9	1.7	1.6
6	3.3	2.3	2.4	2.2	1.9	1.8	2.1	1.8	2.6	.9	1.6	1.5
7	3.0	2.0	2.3	2.1	2.1	1.8	2.6	2.0	1.7	1.0	1.6	5.3
8	2.5	2.0	2.4	2.0	2.4	1.7	3.0	2.2	1.5	.9	1.6	3.9
9	2.3	1.9	2.4	1.9	2.1	1.6	2.2	1.9	1.4	1.0	1.5	3.2
10	2.2	2.0	2.3	1.9	2.1	1.5	2.2	1.8	1.3	3.0	1.5	2.4
11	2.0	2.0	2.2	1.8	2.0	1.7	1.9	1.7	1.3	1.7	1.6	1.9
12	7.0	2.2	3.5	1.7	1.9	1.6	1.7	1.5	1.2	1.6	1.7	3.6
13	4.2	2.7	3.0	1.7	1.9	1.5	1.6	1.4	1.2	1.2	1.6	2.6
14	3.4	3.0	2.7	1.7	1.8	1.5	1.7	1.3	1.2	1.0	1.6	2.4
15	2.8	6.9	2.5	1.8	1.8	2.2	1.5	1.3	1.1	1.0	1.9	1.9

Daily gage height, in feet, of Pigeon River at Newport, Tenn., for 1906 to 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
16	2.4	4.5	2.4	2.6	1.7	2.0	1.8	1.2	1.1	1.0	1.7	2.0
17	2.9	3.5	2.3	2.2	2.0	1.7	1.6	1.3	1.0	1.0	1.6	1.8
18	2.2	3.0	2.2	2.0	1.9	1.6	1.5	1.8	1.0	.9	1.6	1.8
19	2.2	2.9	2.2	1.9	2.4	1.5	1.4	1.5	1.0	.9	1.6	1.9
20	2.1	2.8	2.3	1.8	2.5	1.5	1.4	1.7	.9	.9	1.5	1.6
21	2.1	2.5	4.0	1.8	2.1	1.5	1.3	1.5	.9	.9	1.5	1.5
22	2.1	2.4	3.5	1.7	2.0	1.5	1.3	3.1	1.0	1.0	1.3	1.6
23	2.4	2.3	3.2	1.7	1.9	1.8	1.4	3.0	.9	1.2	1.1	3.6
24	2.2	2.2	5.7	1.7	1.9	1.5	1.2	2.8	1.0	3.2	1.1	2.8
25	2.0	2.2	4.0	1.9	1.8	1.5	1.3	2.9	1.0	1.9	1.5	2.6
26	2.0	2.3	3.2	4.0	1.7	1.7	1.2	3.3	.9	1.8	1.5	2.5
27	2.2	2.3	3.0	2.9	2.0	1.5	1.3	2.4	.9	1.5	1.4	2.3
28	2.3	2.2	2.7	2.6	1.8	1.4	1.4	2.1	.9	1.5	1.3	2.2
29	2.2	2.1	2.6	2.4	1.9	1.3	1.9	1.9	1.5	3.0	1.4	2.7
30	2.0	.....	2.5	2.2	2.3	1.3	1.5	1.8	1.4	3.2	1.3	2.5
31	1.9	.....	2.4	.....	1.9	.....	1.5	1.7	.....	2.7	.....	2.7

Rating table for Pigeon River at Newport, Tenn., for 1905 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	300	2.00	1,220	3.20	2,930	4.80	5,970
.90	345	2.10	1,340	3.30	3,100	5.00	6,370
1.00	400	2.20	1,460	3.40	3,280	5.20	6,770
1.10	460	2.30	1,590	3.50	3,460	5.40	7,170
1.20	525	2.40	1,720	3.60	3,640	5.60	7,580
1.30	595	2.50	1,860	3.70	3,830	5.80	8,000
1.40	665	2.60	2,000	3.80	4,020	6.00	8,420
1.50	740	2.70	2,140	3.90	4,210	6.20	8,840
1.60	820	2.80	2,290	4.00	4,400	6.40	9,260
1.70	910	2.90	2,440	4.20	4,780	6.60	9,690
1.80	1,010	3.00	2,600	4.40	5,170	6.80	10,130
1.90	1,110	3.10	2,760	4.60	5,570	7.00	10,570

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on dischagre measurements made during 1904 to 1907 and is fairly well defined between gage heights 1.6 feet and 4.5 feet.

Monthly discharge of Pigeon River at Newport, Tenn., for 1906 to 1908.

[Drainage area, 655 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1906.						
December	3,640	910	1,380	2.11	2.43	B.
1907.						
January	2,600	740	1,090	1.66	1.91	B.
February	2,000	595	967	1.48	1.54	B.
March	2,290	740	1,260	1.92	2.21	B.
April	1,720	820	1,170	1.79	2.00	B.
May	2,930	740	1,370	2.09	2.41	B.
June	3,830	740	1,230	1.88	2.10	B.
July	1,220	525	823	1.26	1.45	B.
August	1,010	345	597	.911	1.05	C.
September 1–16	2,000	300	529	.808	.48	C.
November 7–30	4,210	400	1,100	1.68	1.50	B.
December	3,460	525	1,120	1.71	1.97	B.
1908.						
January	10,600	1,110	2,210	3.37	3.88	A.
February	10,400	1,110	2,180	3.33	3.59	A.
March	7,790	1,220	2,340	3.57	4.12	A.
April	4,400	910	1,440	2.20	2.46	B.
May	1,860	910	1,250	1.91	2.20	B.
June	1,460	595	848	1.29	1.44	B.
July	2,600	525	912	1.39	1.60	B.
August	3,100	525	1,170	1.79	2.06	B.
September	2,000	345	576	.879	.98	C.
October	2,930	345	848	1.30	1.50	B.
November	1,720	460	836	1.28	1.43	B.
December	6,970	740	1,820	2.78	3.20	B.
The year	10,600	345	1,370	2.09	28.46	

NOLICHUCKY RIVER NEAR GREENVILLE, TENN.

Nolichucky River is formed by the junction of Toe and Caney rivers about 8 or 9 miles east of the Tennessee state line. The river flows almost due north for several miles, then turns toward the northwest and flows in a deep gorge through the Unaka Mountains into Tennessee, where, preserving its general westerly direction, it finally enters French Broad River about 7½ miles southeast of Morristown. The whole area is subject to sudden and violent rains, producing great floods, while in the winter the ice moving downstream sometimes forms ice dams, which do a great deal of damage.

The rainfall over the basin is about 51.2 inches per annum. The tributaries, like the main stream, rise near the summits of mountain chains and flow over rocky and precipitous beds through narrow valleys.

The fall of the river, although less than might naturally be expected in a stream draining so high and mountainous an area, is considerable. The total fall between the junction of the North and South Toe and Embreville is about 850 feet in a distance, following the course of the river, of about 40 miles, an average of about 21 feet to the mile. Throughout this part of its course the river flows in a gorge with steep and rocky sides and the fall per mile is large. About 1½ miles below the mouth of Caney River, where the stream is about 200 feet wide, there is a fall of 25 feet or a little more in half a mile.

The gaging station is located at Jones Bridge, 5 miles southeast of Greenville and one-half mile below Camp Creek. It was established May 7, 1903, for obtaining general run-off data.

The station was discontinued December 31, 1908.[a]

Daily gage height, in feet, of Nolichucky River near Greeneville, Tenn., for 1907 and 1908.

[Observer, B. H. Jones.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.8	0.7	1.35	0.9	1.2	0.8	1.1	0.75	0.3	0.7	0.3	0.7
2	2.25	.85	1.9	.9	1.2	3.5	.95	.65	.3	.6	.3	.65
3	1.85	.9	2.0	.75	1.1	3.2	1.05	.55	.5	.5	.4	.6
4	1.7	.9	1.9	.7	1.5	2.9	1.0	.5	.6	.5	.55	.55
5	1.6	1.1	1.7	.7	1.65	2.1	.8	.5	.55	1.2	.4	.5
6	1.45	1.2	1.2	.75	1.4	1.7	.75	.45	.45	1.05	.4	.45
7	1.4	1.0	1.1	1.5	1.9	1.4	.7	.55	.4	.8	.4	.4
8	1.3	.9	1.2	1.4	1.7	1.55	.65	.75	.4	.7	.35	.45
9	1.25	.9	1.4	1.5	1.5	3.6	.6	1.0	.6	.65	.35	.5
10	1.2	.85	1.4	1.5	1.4	2.75	.6	.75	.55	.6	.35	.65
11	1.15	.85	2.8	1.3	1.3	2.25	.55	.55	.5	.5	.3	1.6
12	1.15	.8	2.15	1.4	1.25	2.0	.65	.5	.8	.5	.4	1.15
13	1.05	.7	1.75	1.2	1.15	1.7	1.8	.45	.5	.45	.35	.95
14	1.0	.7	1.6	1.1	1.1	2.4	1.45	.4	.45	.4	.3	.8
15	1.0	.7	1.7	1.0	1.0	2.0	1.55	.35	.35	.4	.3	.9
16	1.0	.65	1.75	1.0	.95	1.7	1.4	.3	.3	.4	.3	1.4
17	.95	.65	1.5	1.0	.9	1.5	1.15	.35	.35	.35	.6	1.1
18	.95	.65	1.35	1.0	.85	1.15	1.2	.5	.35	.35	.6	.9
19	.95	.65	1.3	1.2	.8	1.1	2.15	.75	.4	.4	.65	.7
20	.9	.65	1.2	1.7	.75	1.0	1.2	.5	.5	.35	.7	.7

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Nolichucky River near Greeneville, Tenn., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	0.9	0.6	1.15	1.4	0.7	1.0	1.0	0.55	0.95	0.35	0.6	0.65
22	.8	.6	1.05	1.2	.7	.95	.85	.5	.9	.35	.65	.65
23	.8	.55	1.0	1.5	.65	1.0	.75	.65	3.00	.3	.9	.8
24	.8	.55	.95	2.2	.65	1.1	.65	.9	3.45	.3	1.6	2.2
25	.75	.75	.9	1.7	.65	1.2	.6	1.0	1.75	.3	1.7	1.45
26	.75	1.35	.85	1.2	.85	1.0	.6	.9	1.2	.3	1.3	1.1
27	.8	1.3	.8	1.4	.85	1.1	.85	.8	.9	.3	1.0	1.0
28	.75	1.35	.8	1.55	.65	.9	.65	.7	.8	.3	.9	.95
29	.65	.....	.75	1.35	.65	1.45	.55	.45	.8	.3	.85	.9
30	.65	.....	.75	1.35	.55	1.45	1.5	.4	.8	.3	.75	1.5
31	.65	.....	.75	.....	.55	.....	.9	.4	.....	.3	.....	3.1
1908.												
1	1.9	.9	1.8	1.45	1.55	1.1	.5	.9	.9	.35	2.0	.9
2	1.5	.85	2.2	1.65	1.4	1.0	.8	.7	.8	.25	1.65	.95
3	1.3	.8	2.1	2.1	1.3	.9	.65	.65	.75	.2	1.45	.9
4	1.15	.95	1.95	1.55	1.2	1.1	1.0	.65	.65	.2	1.3	.85
5	2.3	1.1	1.8	1.45	1.15	1.25	1.0	.75	.6	.2	1.2	.85
6	2.2	1.1	2.3	1.4	1.15	1.0	1.25	.85	.8	.2	1.05	.85
7	1.75	1.2	2.25	1.35	1.45	.9	2.0	1.25	.7	.15	1.0	2.6
8	1.6	1.2	2.2	1.25	2.1	1.1	4.3	1.0	.7	.15	.9	3.0
9	1.35	1.1	1.9	1.2	1.55	.95	2.25	1.25	.75	.2	.9	2.45
10	1.2	1.1	1.7	1.2	1.4	.8	1.9	1.1	.6	.15	.8	1.75
11	1.0	1.35	1.55	1.1	1.3	.9	1.4	.85	.55	1.8	.9	1.45
12	9.1	1.75	2.0	2.1	1.15	.8	1.05	.8	.5	.95	1.2	1.55
13	4.2	2.65	2.7	1.0	1.15	.7	.9	.6	.45	.65	1.0	2.0
14	2.8	3.2	2.2	1.0	1.1	.7	.9	.5	.45	.5	.9	1.65
15	2.2	4.9	1.9	.95	1.1	2.2	1.0	.5	.4	.45	1.0	1.65
16	1.95	4.4	1.8	1.4	1.0	2.0	.8	.45	.4	.4	1.0	1.5
17	1.85	3.8	1.65	2.2	1.1	1.3	.8	.45	.35	.3	.9	1.15
18	1.65	2.8	1.6	1.75	1.1	1.0	.7	.55	.35	.3	.9	1.1
19	1.5	2.0	1.65	1.6	1.3	.9	.7	.55	.3	.3	.9	1.1
20	1.4	1.85	1.65	1.45	1.9	.8	.55	1.15	.3	.25	.9	1.05
21	1.3	1.65	2.6	1.25	2.0	.8	.55	.65	.3	.25	.9	1.0
22	1.25	1.55	2.6	1.15	1.6	.9	.5	.7	.3	.25	.8	1.65
23	1.25	1.4	2.5	1.1	1.3	1.0	.7	.9	.3	.45	.75	3.1
24	1.25	1.3	4.0	1.0	1.3	.95	1.0	1.0	.25	6.8	.7	2.2
25	1.0	1.2	3.3	1.15	1.0	.7	.7	1.45	.2	2.5	.7	2.0
26	1.05	1.4	2.5	5.0	1.0	1.0	.6	5.5	.2	2.0	.65	1.8
27	1.35	1.2	2.1	2.8	1.3	.7	.5	2.5	.2	1.45	.65	1.7
28	1.3	1.2	1.9	2.0	1.35	.55	1.0	1.7	.2	1.2	.6	1.5
29	1.1	1.1	1.7	1.8	1.35	.55	1.25	1.4	.3	2.3	.6	1.0
30	1.1	.....	1.65	1.55	2.1	.5	1.2	1.2	.5	3.5	.7	1.7
31	.9	.....	1.5	.....	1.9	.....	1.45	1.0	.....	2.45	.....	1.8

Rating table for Nolichucky River near Greeneville, Tenn., for 1906 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.10	550	1.60	2,580	3.10	5,720	5.00	9,900
.20	640	1.70	2,760	3.20	5,940	5.20	10,340
.30	735	1.80	2,950	3.30	6,160	5.40	10,780
.40	835	1.90	3,140	3.40	6,380	5.60	11,220
.50	940	2.00	3,340	3.50	6,600	5.80	11,660
.60	1.060	2.10	3,540	3.60	6,820	6.00	12,100
.70	1.180	2.20	3,750	3.70	7,040	6.20	12,540
.80	1.310	2.30	3,960	3.80	7,260	6.40	12,980
.90	1,450	2.40	4.180	3.90	7,480	6.60	13,420
1.00	1,590	2.50	4,400	4.00	7,700	6.80	13,860
1.10	1,740	2.60	4,620	4.20	8,140	7.00	14,300
1.20	1,900	2.70	4,840	4.40	8,580	8.00	16,500
1.30	2,060	2.80	5,060	4.60	9,020	9.00	18,700
1.40	2,230	2.90	5,280	4.80	9,460	10.00	20,900
1.50	2,400	3.00	5,500				

NOTE.—The above table is applicable only for open-channel conditions. It is based upon three discharge measurements made during 1906 and the general form of previous curves. Above gage height 2.3 feet the rating curve is a tangent, the difference being 220 per tenth.

Monthly discharge of Nolichucky River near Greeneville, Tenn., for 1907 and 1908.

[Drainage area, 1,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	5,060	1,120	1,860	1.69	1.95	B.
February	2,140	1,000	1,380	1.25	1.30	B.
March	5,060	1,240	2,210	2.01	2.32	B.
April	3,750	1,180	2,000	1.82	2.03	B.
May	3,140	1,000	1,680	1.53	1.76	B.
June	6,820	1,310	2,920	2.65	2.96	B.
July	3,640	1,000	1,600	1.45	1.67	B.
August	1,590	735	1,060	.964	1.11	B.
September	6,490	735	1,440	1.31	1.46	B.
October	1,900	735	935	.850	.98	C.
November	2,760	735	1,130	1.03	1.15	B.
December	5,720	835	1,630	1.48	1.71	B.
The year	6,820	735	1,650	1.50	20.40	
1908.						
January	18,900	1,450	3,160	2.87	3.31	B.
February	9,680	1,310	3,040	2.76	2.98	B.
March	7,700	2,400	3,590	3.26	3.76	B.
April	9,900	1,520	2,660	2.42	2.70	B.
May	3,540	1,590	2,210	2.01	2.32	B.
June	3,750	940	1,580	1.44	1.61	B.
July	8,360	940	1,850	1.68	1.94	B.
August	11,000	888	1,860	1.69	1.95	B.
September	1,450	640	923	.839	.94	C.
October	13,900	595	1,950	1.77	2.04	B.
November	3,340	1,060	1,570	1.43	1.60	B.
December	5,710	1,380	2,620	2.38	2.74	B.
The year	18,900	595	2,250	2.05	27.89	

NORTH TOE RIVER AT SPRUCE PINE, N. C.

North Toe River rises on the western slopes of the Blue Ridge, in the northwestern part of Mitchell County, N. C. Its course is circuitous, first to the southwest, then to the west, and then to the northwest, and it unites with the South Toe on the line between Mitchell and Yancey counties. The headwater region is very rough, with steep mountain slopes and narrow valleys sparsely populated. The tributaries as far down as Spruce Pine flow directly from the mountains in narrow gorges. They are for the most part short streams with great fall but with little water. Powers of considerable magnitude, however, can be developed on these streams, for although the amount of water carried by each is small, the fall obtainable in a short distance is large.

The gaging station, which is located at a suspension footbridge about 600 feet west of the railroad station at Spruce Pine, was established June 19, 1907, as one of the stations maintained in cooperation with the Forest Service for the purpose of getting run-off and water-power data in the southern Appalachian Mountains. The station is one-half mile below Beaver Creek, which is a small stream.

Discharge measurements are made from the footbridge, where the current is partly sluggish and the bed is sandy and probably shifting, making rather poor conditions for measurements.

The station was discontinued July 1, 1908.[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of North Toe River at Spruce Pine, N. C., 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 19	Warren E. Hall	85	211	0.98	248
June 20	do	85	220	.98	248
August 6	do	82	186	.79	154
Do	B. M. Hall, jr	82	186	.79	151
September 4	do	82	181	.81	168

Daily gage height, in feet, of North Toe River at Spruce Pine, N. C., for 1907 and 1908.

[Observer, P. A. Rose.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.1	1.0	0.8	0.8	0.8	0.8
2							1.1	1.0	.8	.8	.9	.8
3							1.1	1.0	.8	.8	.8	.8
4							1.0	1.0	.8	.8	.8	.8
5							1.0	.9	.8	1.1	.7	.8
6							1.0	.9	.8	.8	.7	.8
7							1.0	.8	.8	.8	.7	.8
8							1.0	.8	.8	.8	.7	.8
9							1.0	.8	.8	.8	.7	1.4
10							1.0	.9	.8	.8	.7	1.2
11							1.0	.9	1.8	.8	.7	1.0
12							1.0	1.0	1.0	.8	.7	1.1
13							1.1	.8	.9	.8	.7	1.1
14							1.2	.8	.9	.8	.7	1.5
15							1.1	.8	.8	.8	.7	1.4
16							1.1	.8	.8	.8	.7	1.2
17							1.1	1.1	.7	.8	.8	.9
18							1.1	.8	.7	.8	.8	.9
19						1.0	1.0	.8	.7	.7	.8	.9
20						1.0	1.0	.8	.7	.7	.8	.9
21						1.1	1.1	.8	.7	.7	1.0	.9
22						1.0	1.1	.8	.7	.7	1.0	1.0
23						1.1	.9	.8	5.8	.7	1.0	1.8
24						1.2	1.0	.8	2.1	.7	1.0	1.4
25						1.0	1.0	.8	1.1	.7	1.0	1.2
26						1.1	.9	.8	1.0	.7	.9	1.0
27						1.1	.9	.8	1.0	.8	.8	1.0
28						1.3	1.0	.8	1.0	.8	.8	1.0
29						1.2	1.0	.8	1.0	.8	.8	1.0
30						1.1	1.0	.8	1.0	.8	.8	1.5
31							1.0	.8		.8		1.3

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1		1.2	1.3	1.2	1.2	1.0	16	1.4	1.9	1.2	1.6	1.0	1.2
2		1.6	1.4	1.3	1.2	1.0	17	1.2	1.6	1.2	1.3	1.1	1.0
3		1.6	1.4	1.2	1.2	1.0	18	1.0	1.5	1.2	1.3	1.0	1.0
4		1.6	1.4	1.2	1.1	1.1	19	1.2	1.3	1.2	1.3	1.4	1.0
5	1.0	1.6	1.3	1.2	1.1	1.1	20	1.1	1.2	1.2	1.1	1.1	1.0
6	1.0	1.6	1.5	1.1	1.1	1.1	21	1.0	1.2	1.3	1.1	1.2	1.1
7	1.0	1.6	1.5	1.1	1.4	1.1	22	1.0	1.3	1.3	1.05	1.1	1.0
8	1.0	1.6	1.5	1.1	1.2	1.1	23	1.1	1.2	1.4	1.05	1.1	1.3
9	1.0	1.8	1.4	1.1	1.2	1.0	24	1.1	1.2	1.6	1.0	1.1	1.0
10	1.0	2.5	1.3	1.1	1.1	1.1	25	1.2	1.2	1.3	1.7	1.1	1.1
11	1.2	2.8	1.2	1.1	1.1	1.0	26	1.2	1.2	1.3	1.6	1.1	1.0
12	3.0	1.8	1.5	1.1	1.1	1.0	27	1.3	1.1	1.2	1.4	1.1	1.0
13	1.6	1.8	1.3	1.0	1.05	1.0	28	1.2	1.1	1.2	1.4	1.1	1.0
14	1.0	1.8	1.4	1.0	1.0	1.0	29	1.2	1.1	1.2	1.3	1.1	.9
15	1.0		1.3	1.1	1.0	1.5	30	1.1		1.2	1.2	1.3	.9
							31	1.1				1.1	

Daily discharge, in second-feet, of North Toe River at Spruce Pine, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec
1907.												
1	.....	.....	.....	.....	.....	.....	320	260	160	160	160	160
2	.....	.....	.....	.....	.....	.....	320	260	160	160	205	160
3	.....	.....	.....	.....	.....	.....	320	260	160	160	160	160
4	.....	.....	.....	.....	.....	.....	260	260	160	160	160	160
5	.....	.....	.....	.....	.....	.....	260	205	160	320	120	160
6	.....	.....	.....	.....	.....	.....	260	205	160	160	120	160
7	.....	.....	.....	.....	.....	.....	260	160	160	160	120	160
8	.....	.....	.....	.....	.....	.....	260	160	160	160	120	160
9	.....	.....	.....	.....	.....	.....	260	160	160	160	120	.....
10	.....	.....	.....	.....	.....	.....	260	205	160	160	120	.....
11	.....	.....	.....	.....	.....	.....	260	205	.....	160	120	260
12	.....	.....	.....	.....	.....	.....	260	260	260	160	120	320
13	.....	.....	.....	.....	.....	.....	320	160	205	160	120	320
14	.....	.....	.....	.....	.....	.....	.....	160	205	160	120	.....
15	.....	.....	.....	.....	.....	.....	320	160	160	160	120	.....
16	.....	.....	.....	.....	.....	.....	320	160	160	160	120	.....
17	.....	.....	.....	.....	.....	.....	320	320	120	160	160	205
18	.....	.....	.....	.....	.....	.....	320	160	120	160	160	205
19	.....	.....	.....	.....	.....	260	260	160	120	120	160	205
20	.....	.....	.....	.....	.....	260	260	160	120	120	160	205
21	.....	.....	.....	.....	.....	320	320	160	120	120	260	205
22	.....	.....	.....	.....	.....	260	320	160	120	120	260	260
23	.....	.....	.....	.....	.....	320	205	160	.....	120	260	.....
24	.....	.....	.....	.....	.....	.....	260	160	.....	120	260	.....
25	.....	.....	.....	.....	.....	260	260	160	320	120	260	.....
26	.....	.....	.....	.....	.....	320	205	160	260	120	205	260
27	.....	.....	.....	.....	.....	320	205	160	260	160	160	260
28	.....	.....	.....	.....	.....	.....	260	160	260	160	160	260
29	.....	.....	.....	.....	.....	.....	260	160	260	160	160	260
30	.....	.....	.....	.....	.....	320	260	160	260	160	160	.....
31	.....	.....	.....	.....	.....	.....	260	160	.....	160	.....	.....

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	.....	.....	.....	.....	.....	260	16	.....	.....	.....	.....	260	.....
2	.....	.....	.....	.....	.....	260	17	.....	.....	.....	.....	320	260
3	.....	.....	.....	.....	.....	260	18	260	.....	.....	.....	260	260
4	.....	.....	.....	.....	320	320	19	.....	.....	.....	.....	.....	260
5	260	.....	.....	.....	320	320	20	320	.....	.....	320	320	260
6	260	.....	.....	320	320	320	21	260	.....	.....	320	.....	320
7	260	.....	.....	320	.....	320	22	260	.....	.....	290	320	260
8	260	.....	.....	320	.....	320	23	320	.....	.....	290	320	.....
9	260	.....	.....	320	.....	260	24	320	.....	.....	260	320	260
10	260	.....	.....	320	320	320	25	.....	.....	.....	.....	320	320
11	.....	.....	.....	320	320	260	26	.....	.....	.....	.....	320	260
12	.....	.....	.....	320	320	260	27	.....	320	.....	.....	320	260
13	.....	.....	.....	260	290	260	28	.....	320	.....	.....	320	260
14	260	.....	.....	260	260	260	29	.....	320	.....	.....	320	205
15	260	.....	.....	320	260	.....	30	320	.....	.....	.....	.....	205
							31	320	.....	.....	.....	320	.....

NOTE.—Daily discharges 1907–8 based on a fairly well defined rating curve. On missing days June 19, 1907, to June 30, 1908, the discharge was greater than 350 second-feet except on days when the gage was not read.

HOLSTON RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The areas drained by Holston River comprise the basins of the North, South, and Middle forks of that stream, the Watauga, and the Nolichucky, including parts of southwestern Virginia, eastern Tennessee, and western North Carolina. The river is one of the largest of the streams which help form the great Tennessee River. It rises along the western slopes of the Blue Ridge, in Smyth and

Bland counties, Va., in three forks, known as the North, Middle, and South forks.

The physical conditions of the drainage basin vary greatly, the character of the country ranging from the gently rolling plain of the South and Middle Forks, with its smooth, rounded, and grass-covered hills, to the grandest and mightiest mountain masses to be found east of the Rocky Mountains, such as the Unakas and the Black Mountains, with their numerous peaks rising more than 6,000 feet above sea level, and with steep and rocky slopes still clad in virgin forest. There are wide variations in the soil and in the general geologic conditions and structure, considerable variation in temperature and rainfall, and still wider variations in the character of the streams of the area, which include the brawling mountain torrents fed by perpetual springs, the puny wet-weather streams of the slate country, and the subterranean streams of the limestone regions.

One of the distinguishing characteristics of the whole basin drained by Holston River is the occurrence of small closed basins or sinks, which are found in great numbers on the low divides between the various tributary watersheds. They are so numerous, in fact, that in many localities it seems impossible that any of the rainfall over areas of a square mile or more can find its way into the streams. Certainly there are no channels visible, and in many places water was seen standing in pools from 50 to 100 feet in diameter, indicating that there is no subterranean passage through which the water finds its way to the streams. Other sinks are dry except after heavy rains. In some places the farmers have rendered the bottoms of these natural basins impervious, and the collected water is used for cattle.

Springs are numerous over all the basin, ranging in size from a discharge of several cubic feet per second to less than a gallon per minute. Many of the smaller streams seem to be fed entirely from this source. In this connection may be noted the fact that a number of streams which at some point in their course sink below the surface of the ground, after flowing there for distances varying from a few yards to half a mile or more reappear on the surface. Some streams were noted which, while discharging no water into the main stream, carried a considerable quantity a short distance above their mouths, the water sinking gradually into the earth as the river was approached. It is said that the Middle Fork loses a quantity of its water in this way, and from the character of the country rock, this seems by no means improbable.

Little definite information can be given regarding the annual rainfall in this basin, but it is well known that throughout the region there is no lack of moisture, showers frequently falling on the mountains when there is not a cloud over the valley. The rainfall in the valley to the west is between 40 and 45 inches per annum, and that on the mountains is certainly greater.

SOUTH FORK OF HOLSTON RIVER NEAR CHILHOWIE, VA.

The South Fork of Holston River rises on the western slopes of the Blue Ridge, in Smyth County, Va., between the slopes of the Brushy Mountains on the north and the Iron Mountains on the south. It is formed by the junction, in a broad stretch of valley land, of Slemp and Cressy creeks, and flowing in a general southwesterly direction is joined by the Middle Fork about 6 miles southeast of Abingdon, Va. The stream below this junction and until the junction with the North Fork is still known as the South Fork. Below the latter junction it is known as Holston River.

The headwaters of the South Fork are at an altitude of about 2,900 feet, the elevation at the junction being about 1,800 feet. The altitude at the junction of Slemp and Cressy creeks is about 2,575 feet. The distance between the latter junction and the junction with the Middle Fork is about 29 miles in a straight line, and the average slope of the country about 27 feet to the mile. Following the course of the river, however, this distance is about 36 miles, and the average fall between 21 and 22 feet to the mile.

Although the basin is, broadly speaking, a plateau, it is not to be inferred that it has not some very sharply marked mountain ridges. The axes of these ridges extend in a northeast-southwest direction, approximately parallel to the course of the principal streams, and the buttressing spurs of the Iron and Stone mountains serrate the southern edge with a series of high and jagged ridges. Away from these, however, the country is composed of a series of low, broad swells and wide, flat valleys, all of the slopes being gentle and covered with grass not unlike the famous blue grass of Kentucky.

The gaging station, which is located 4½ miles south of Chilhowie, was established June 10, 1907, to obtain data for use in determining the water resources and power possibilities of the southern Appalachian Mountains, also for supplying run-off data on the upper Holston drainage where no stream gaging work had previously been done.

Discharge measurements are made from a suspension foot bridge where the current is good ordinarily but rather sluggish at low stage.

Discharge measurements of South Fork of Holston River near Chilhowie, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 10	Warren E. Hall	80	272	1.40	385
August 13	B. M. Hall, jr	79	206	.68	97
September 9	do	80	195	.57	68
1908.					
February 21	Warren E. Hall	85	236	1.07	187
July 7	F. P. Thomas	80	236	1.08	199
Do	do	80	237	1.05	198
Do	Warren E. Hall	80	237	1.08	187

Daily gage height, in feet, of South Fork of Holston River near Chilhowie, Va., for 1907 and 1908.

[Observer, P. Cole.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	0.8	0.9	0.6	0.8	0.6	0.8
2	.....	.....	.....	.....	.....	.....	.7	.8	.6	.7	.5	.9
3	.....	.....	.....	.....	.....	.....	.9	.8	.6	.7	.8	.8
4	.....	.....	.....	.....	.....	.....	.7	.7	.6	.7	.8	.8
5	.....	.....	.....	.....	.....	.....	.7	.7	.6	.9	.7	.7
6	.....	.....	.....	.....	.....	.....	.7	.7	.6	.8	.7	.7
7	.....	.....	.....	.....	.....	.....	.7	.7	.6	.8	.7	.7
8	.....	.....	.....	.....	.....	.....	.6	.7	.6	.7	.6	.6
9	.....	.....	.....	.....	.....	.....	.6	.6	.5	.7	.6	.7
10	.....	.....	.....	.....	.....	1.4	.8	.8	.5	.7	.9	.8
11	.....	.....	.....	.....	.....	4.4	.8	.7	.6	.7	1.3	.9
12	.....	.....	.....	.....	.....	2.6	.7	.7	.6	.6	1.1	.9
13	.....	.....	.....	.....	.....	3.0	1.4	.7	.6	.6	1.0	.9
14	.....	.....	.....	.....	.....	4.1	1.1	.6	.5	.6	.9	1.0
15	.....	.....	.....	.....	.....	2.6	.9	.6	.5	.6	.8	1.3
16	.....	.....	.....	.....	.....	1.9	1.0	.6	.5	.6	.8	1.3
17	.....	.....	.....	.....	.....	1.6	.9	.8	.5	.6	.7	1.2
18	.....	.....	.....	.....	.....	1.4	.8	.8	.7	.6	.8	1.1
19	.....	.....	.....	.....	.....	1.3	1.0	.7	.7	.6	.9	1.0
20	.....	.....	.....	.....	.....	1 2	.9	.7	.7	.5	1.0	.9
21	.....	.....	.....	.....	.....	1.1	.8	.6	.6	.5	1.0	.9
22	.....	.....	.....	.....	.....	1.1	.7	.6	.8	.5	1.0	.8
23	.....	.....	.....	.....	.....	1.0	.8	.6	2.3	.5	1.0	1.0
24	.....	.....	.....	.....	.....	1.0	.7	.8	2.1	.5	1.4	1.5
25	.....	.....	.....	.....	.....	1.0	.7	.7	1.5	.5	1.5	1.3
26	.....	.....	.....	.....	.....	.9	.7	.7	1.2	.5	1.3	1.1
27	.....	.....	.....	.....	.....	.9	.7	.6	1.0	.5	1.1	1.0
28	.....	.....	.....	.....	.....	.8	.6	.6	.9	.6	1.0	1.0
29	.....	.....	.....	.....	.....	.9	.6	.6	.9	.6	1.0	.9
30	.....	.....	.....	.....	.....	.8	1.3	.6	.8	.5	.9	1.2
31	.....	.....	.....	.....	.....	.....	1.0	.9	.....	.5	.....	1.6
1908.												
1	1.4	0.9	1.1	1.3	0.9	.8	1.2	.6	.6	.4	1.1	.9
2	1.2	.9	1.6	2.5	.9	.8	.9	.5	.6	.4	1.0	1.2
3	1.1	.8	1.5	2.6	.9	.8	.8	.5	.6	.4	.9	1.1
4	1.0	.8	1.4	1.9	.8	1.2	.8	.6	.6	.4	.8	1.0
5	1.3	.9	1.3	1.6	.8	1.9	1.2	.5	.5	.4	.8	.9
6	1.3	1.0	2.1	1.4	.8	1.4	1.2	.6	.6	.4	.7	.9
7	1.2	1.0	1.8	1.3	1.1	1.1	1.1	.6	.6	.4	.7	1.4
8	1.1	.9	1.5	1.2	1.5	1.0	1.0	.6	.5	.4	.7	2.1
9	1.0	.9	1.3	1.1	1.3	.9	1.0	.8	.6	.4	.6	1.5
10	1.0	.9	1.2	1.0	1.2	.9	.9	.7	.5	.6	.6	1.3
11	.9	.9	1.1	1.0	1.1	.8	.8	.6	.5	.6	.7	1.1
12	4.0	1.1	1.2	1.0	1.0	.8	.8	.6	.5	.5	.8	1.3
13	2.4	1.8	1.1	.9	1.0	.8	.7	.6	.5	.5	.8	1.3
14	1.8	2.2	1.1	.9	.9	.7	1.0	.6	.5	.4	.8	1.2
15	1.6	2.5	1.1	.9	.9	1.1	.8	.5	.5	.4	.8	1.1
16	1.4	2.1	1.1	.9	.8	.9	.8	.5	.5	.4	.7	1.0
17	1.3	1.7	1.0	.9	.8	.8	.7	.5	.4	.4	.7	1.0
18	1.2	1.4	1.0	.8	.8	.8	.7	.5	.4	.4	.8	.9
19	1.1	1.3	1.0	.8	.8	.7	.8	.6	.4	.4	.9	9
20	1.1	1.2	1.0	.8	.9	.7	.7	.6	.4	.4	.9	.9
21	1.0	1.1	1.1	.8	.8	.7	.6	.5	.5	.4	.9	.9
22	1.0	1.1	1.2	.8	.8	.7	.9	.6	.4	.4	.8	1.0
23	1.1	1.0	1.3	.8	.8	1.2	.7	.8	.4	.4	.8	1.1
24	1.0	1.0	1.4	.7	.8	1.0	.7	.7	.4	.8	.7	1.0
25	1.0	.9	1.4	.9	.9	.9	.6	.6	.4	.7	.7	1.1
26	1.0	1.0	1.3	1.4	.8	.8	.6	.9	.4	.6	.7	1.6
27	1.1	1.0	1.2	1.2	1.0	.7	.7	.9	.4	.6	.7	1.4
28	1.0	.9	1.1	1.1	1.0	.7	.6	.8	.4	.6	.6	1.3
29	1.0	.9	1.0	1.0	.9	.7	.6	.7	.4	.9	.6	1.3
30	.9	.....	1.0	.9	1.1	.7	.7	.7	.4	1.4	.7	1.6
31	.9	.....	.9	.....	.9	.....	.6	.7	.....	1.5	.....	1.8

Daily discharge, in second-feet, of South Fork of Holston River near Chilhowie, Va., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	119	145	79	119	79	119
2	.....	.....	.....	.....	.....	.....	97	119	79	97	65	145
3	.....	.....	.....	.....	.....	.....	145	119	79	97	119	119
4	.....	.....	.....	.....	.....	.....	97	97	79	97	119	119
5	.....	.....	.....	.....	.....	.....	97	97	79	145	97	97
6	.....	.....	.....	.....	.....	.....	97	97	79	119	97	97
7	.....	.....	.....	.....	.....	.....	97	97	79	119	97	97
8	.....	.....	.....	.....	.....	.....	79	97	79	97	79	79
9	.....	.....	.....	.....	.....	.....	79	79	65	97	79	97
10	.....	.....	.....	.....	.....	360	119	119	65	97	145	119
11	.....	.....	.....	.....	.....	.....	119	97	79	97	300	145
12	.....	.....	.....	.....	.....	.....	97	97	79	79	210	145
13	.....	.....	.....	.....	.....	.....	360	97	79	79	175	145
14	.....	.....	.....	.....	.....	.....	210	79	65	79	145	175
15	.....	.....	.....	.....	.....	.....	145	79	65	79	119	300
16	.....	.....	.....	.....	.....	760	175	79	65	79	119	300
17	.....	.....	.....	.....	.....	505	145	119	65	79	97	250
18	.....	.....	.....	.....	.....	360	119	119	97	79	119	210
19	.....	.....	.....	.....	.....	300	175	97	97	79	145	175
20	.....	.....	.....	.....	.....	250	145	97	97	65	175	145
21	.....	.....	.....	.....	.....	210	119	79	79	65	175	145
22	.....	.....	.....	.....	.....	210	97	79	119	65	175	119
23	.....	.....	.....	.....	.....	175	119	79	.....	65	175	175
24	.....	.....	.....	.....	.....	175	97	119	.....	65	360	430
25	.....	.....	.....	.....	.....	175	97	97	430	65	430	300
26	.....	.....	.....	.....	.....	145	97	97	280	65	300	210
27	.....	.....	.....	.....	.....	145	97	79	175	65	210	175
28	.....	.....	.....	.....	.....	119	79	79	145	79	175	175
29	.....	.....	.....	.....	.....	145	79	79	145	79	175	145
30	.....	.....	.....	.....	.....	119	300	79	119	65	145	250
31	.....	.....	.....	.....	.....	.....	175	145	.....	65	.....	505
1908.												
1	360	145	210	300	145	119	250	79	79	55	210	145
2	250	145	505	.....	145	119	145	65	79	55	175	250
3	210	119	430	.....	145	119	119	65	79	55	145	210
4	175	119	360	760	119	250	119	79	79	55	119	175
5	300	145	300	505	119	760	250	65	65	55	119	145
6	300	175	.....	360	119	360	250	79	79	55	97	145
7	250	175	670	300	210	210	210	79	79	55	97	360
8	210	145	430	250	430	175	175	79	65	55	97	.....
9	175	145	300	210	300	145	175	119	79	55	79	430
10	175	145	250	175	250	145	145	97	65	79	79	300
11	145	145	210	175	210	119	119	79	65	79	97	210
12	.....	210	250	175	175	119	119	79	65	65	119	300
13	.....	670	210	145	175	119	97	79	65	65	119	300
14	670	.....	210	145	145	97	175	79	65	55	119	250
15	505	.....	210	145	145	210	119	65	65	55	119	210
16	360	.....	210	145	119	145	119	65	65	55	97	175
17	300	585	175	145	119	119	97	65	55	55	97	175
18	250	360	175	119	119	119	97	65	55	55	119	145
19	210	300	175	119	119	97	119	79	55	55	145	145
20	210	250	175	119	145	97	97	79	55	55	145	145
21	175	210	210	119	119	97	79	65	65	55	145	145
22	175	210	250	119	119	97	145	79	55	55	119	175
23	210	175	300	119	119	250	97	119	55	55	119	210
24	175	175	360	97	119	175	97	97	55	119	97	175
25	175	145	360	145	145	145	79	79	55	97	97	210
26	175	175	300	360	119	119	79	145	55	79	97	505
27	210	175	250	250	175	97	97	145	55	79	97	360
28	175	145	210	210	175	97	79	119	55	79	79	300
29	175	145	175	175	145	97	79	97	55	145	79	300
30	145	.....	175	145	210	97	97	97	55	360	97	505
31	145	.....	145	.....	145	.....	79	97	.....	430	.....	670

NOTE.—Daily discharges for 1907 and 1908 based on a fairly well defined rating between gage heights 0.5 foot and 1.5 feet. On missing days, beginning June 10, 1907, the discharge was greater than 900 second-feet.

SOUTH FORK OF HOLSTON RIVER AT BLUFF CITY, TENN.

This station is located at the highway bridge at Bluff City, Tenn., about 300 feet below the bridge of the Virginia and Southwestern Railroad. It is about 10 miles above the mouth of Watauga River and 1 mile below Indian Creek. It was originally established by the United States Weather Bureau. The United States Geological Survey maintained gage heights from July 17, 1900, to December 31, 1904, but since that time these records have been furnished by the United States Weather Bureau.

The station is maintained for the purpose of obtaining run-off data for the Holston River drainage basin, and its record is the longest and best one available.

The bed is rocky and very rough, and ledges above and below the bridge cause eddies and sudden variations in the velocity, making discharge measurements difficult. The rating curve, however, is fairly good and constant.

The datum of the gage has not been changed.

Discharge measurements of South Fork of Holston River at Bluff City, Tenn., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907.					
August 12	Warren E. Hall	232	549	1.40	927
1908.					
February 25	Warren E. Hall	241	623	1.80	1,280
July 8	do	241	642	1.83	1,330
Do	F. P. Thomas	241	653	1.83	1,420

Daily gage height, in feet, of South Fork of Holston River at Bluff City, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.3	1.3	3.0	2.0	1.6	1.3	1.7	1.7	1.0	1.6	1.0	1.8
2	3.0	1.4	3.4	1.9	1.7	2.3	1.5	1.6	1.0	1.5	1.0	1.7
3	2.8	1.5	4.0	1.7	1.6	5.0	1.5	1.5	1.2	1.4	1.8	1.6
4	2.5	1.5	3.2	1.6	1.8	3.9	1.5	1.3	1.1	1.4	1.6	1.5
5	2.6	2.0	2.6	1.5	1.9	3.0	1.4	1.2	1.0	2.0	1.3	1.5
6	2.3	1.8	2.4	2.1	1.6	2.4	1.3	1.4	1.0	1.4	1.2	1.5
7	2.1	1.6	2.2	1.8	3.9	2.0	1.7	1.5	.9	1.5	1.2	1.3
8	2.0	1.6	2.3	2.7	3.4	2.2	1.3	1.5	1.5	1.5	1.2	1.2
9	2.0	1.6	2.5	3.4	2.9	3.7	1.2	1.4	1.3	1.5	1.1	1.2
10	1.9	1.5	2.6	3.4	2.4	3.2	1.2	2.5	1.0	1.4	2.3	1.8
11	1.7	1.5	3.5	2.9	2.2	3.0	2.7	2.0	1.8	1.3	3.9	3.5
12	1.7	1.5	3.5	2.5	2.1	5.9	2.7	1.5	2.0	1.3	2.9	2.7
13	1.6	1.4	3.0	2.5	1.9	3.9	5.4	1.4	1.4	1.3	2.6	2.3
14	1.6	1.4	2.7	2.4	1.8	11.7	4.0	1.8	1.0	1.3	2.0	2.0
15	1.5	1.4	3.4	2.2	1.8	5.9	3.0	1.4	1.0	1.2	1.8	2.6
16	1.5	1.3	3.2	2.1	1.7	3.9	3.2	1.3	1.0	1.0	1.7	2.9
17	1.5	1.2	2.8	2.2	1.7	3.7	2.8	1.4	.9	1.0	1.5	2.7
18	1.5	1.2	2.6	2.3	1.5	2.9	2.4	2.4	.9	1.0	1.7	2.4
19	2.0	1.0	2.0	2.3	1.4	2.7	2.4	2.0	.9	1.0	1.9	2.4
20	2.8	1.0	2.2	2.4	1.4	2.4	2.2	1.5	1.0	1.0	2.0	2.0

Daily gage height, in feet, of South Fork of Holston River at Bluff City, Tenn., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	2.6	1.1	2.1	2.3	1.3	2.2	3.0	1.4	0.9	1.0	1.9	1.9
22	2.2	1.1	1.8	2.2	1.2	2.1	2.8	1.3	1.5	1.0	2.0	1.9
23	2.0	1.0	1.8	2.2	1.1	2.0	1.7	1.3	4.5	1.0	1.8	1.6
24	1.9	1.0	1.7	2.4	1.1	2.7	1.6	1.4	6.2	1.0	3.6	2.3
25	1.8	2.5	1.7	2.4	1.0	2.0	1.5	1.8	3.5	1.0	3.8	2.2
26	1.7	2.4	1.6	2.3	1.0	1.8	1.5	1.5	2.7	.9	3.1	2.1
27	1.6	2.5	1.5	2.2	1.0	1.7	2.1	1.3	2.2	.9	2.6	1.8
28	1.4	2.7	1.4	1.9	1.0	1.7	1.5	1.2	1.9	1.1	2.2	1.7
29	1.4	.....	1.4	1.9	1.0	1.7	1.4	1.2	2.0	1.3	2.0	1.9
30	1.4	.....	1.4	1.8	1.0	2.1	2.8	1.1	2.0	1.0	2.0	2.7
31	1.3	.....	1.4	.....	1.0	.....	2.0	1.0	.....	1.0	.....	4.8
1908.												
1	3.6	2.0	3.0	2.6	2.0	1.5	1.5	.8	.6	.3	1.9	1.9
2	2.9	1.9	3.4	7.0	1.8	1.4	1.5	.7	.5	.3	1.5	2.9
3	2.5	1.8	3.4	6.8	1.8	1.3	1.4	.5	.4	.2	1.3	2.3
4	2.1	1.9	3.1	4.5	1.8	1.9	1.3	.6	.4	.2	1.1	1.9
5	3.9	1.8	2.8	3.5	1.7	3.3	1.5	.5	.4	.2	1.0	1.7
6	3.4	2.0	5.1	3.1	1.8	2.7	1.9	.6	1.5	.2	.9	1.6
7	2.9	2.7	4.3	2.8	4.1	2.0	2.1	.6	1.4	.2	.8	2.9
8	2.7	2.3	3.4	2.6	4.5	1.7	1.9	.5	.9	.2	.8	5.9
9	2.6	2.0	3.0	2.3	3.4	1.6	1.8	1.3	.6	.2	.7	3.5
10	2.2	1.9	2.8	2.3	2.8	1.5	1.6	1.4	.5	.6	.7	2.6
11	2.1	2.2	2.4	2.1	2.5	1.5	1.4	1.1	.4	.9	.7	2.2
12	8.9	2.3	3.0	2.1	2.4	1.4	1.2	.8	.4	.8	1.5	2.5
13	6.8	2.0	3.0	2.0	2.1	1.2	1.1	.7	.4	.6	1.3	3.0
14	4.4	4.4	2.8	1.8	1.9	1.0	1.1	.5	.4	.4	1.2	2.5
15	3.6	4.7	2.6	1.8	1.8	2.4	1.3	.5	.3	.4	1.2	2.1
16	3.1	4.9	2.6	2.0	1.7	2.2	1.3	.5	.4	.3	1.1	1.9
17	2.9	3.7	2.4	2.0	1.6	1.7	1.0	.5	.4	.3	1.0	1.8
18	2.7	3.0	2.4	1.9	1.7	1.5	.9	.5	.4	.3	1.1	1.7
19	2.6	2.7	2.6	1.8	1.8	1.4	1.0	.6	.3	.2	1.2	1.7
20	2.4	2.5	2.9	1.8	2.2	1.2	1.0	.8	.3	.2	1.1	1.7
21	2.3	2.2	3.5	1.7	2.2	1.2	.9	.5	.2	.2	1.1	1.6
22	2.1	2.1	3.4	1.6	2.0	1.2	.8	.6	.2	.2	1.3	1.9
23	2.3	2.0	3.3	1.6	1.9	2.4	1.1	.7	.3	.2	1.2	3.9
24	2.3	1.9	3.9	1.5	1.8	2.4	.9	1.0	.2	.5	1.1	3.0
25	2.1	1.9	3.7	1.8	1.7	2.4	.9	.7	.2	1.0	1.0	2.7
26	2.1	1.8	3.2	4.0	1.6	1.8	.7	.9	.3	.8	.9	3.4
27	2.2	1.9	2.7	3.1	1.5	1.4	.7	1.2	.2	.7	.8	3.0
28	2.3	1.9	2.6	2.6	1.5	1.2	1.4	1.0	.2	.6	.8	2.8
29	2.1	1.8	2.2	2.2	1.8	1.1	1.2	.8	.3	1.0	.8	2.9
30	2.1	.....	2.0	1.9	2.4	1.1	1.0	.6	.4	2.3	1.0	3.1
31	1.9	.....	2.0	.....	1.9	.....	1.0	.6	.....	2.3	.....	3.4

Rating table for South Fork of Holston River at Bluff City, Tenn., for 1900 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.20	245	1.70	1,190	3.20	2,900	5.40	6,580
.30	285	1.80	1,280	3.30	3,040	5.60	6,990
.40	325	1.90	1,380	3.40	3,180	5.80	7,410
.50	370	2.00	1,480	3.50	3,320	6.00	7,830
.60	420	2.10	1,580	3.60	3,460	6.20	8,270
.70	475	2.20	1,680	3.70	3,610	6.40	8,720
.80	530	2.30	1,790	3.80	3,760	6.60	9,180
.90	590	2.40	1,900	3.90	3,910	6.80	9,640
1.00	650	2.50	2,010	4.00	4,060	7.00	10,100
1.10	715	2.60	2,130	4.20	4,390	8.00	12,500
1.20	785	2.70	2,250	4.40	4,730	9.00	14,900
1.30	860	2.80	2,370	4.60	5,080	10.00	17,300
1.40	940	2.90	2,500	4.80	5,440	11.00	19,700
1.50	1,020	3.00	2,630	5.00	5,800	12.00	22,100
1.60	1,105	3.10	2,760	5.20	6,180		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on discharge measurements made during 1900 to 1908, and is fairly well defined below gage height 3.5 feet. Above gage height 7.0 feet the rating curve is a tangent, the difference being 240 per tenth.

Monthly discharge of South Fork of Holston River at Bluff City, Tenn., for 1907 and 1908.

[Drainage area, 828 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	3,040	860	1,490	1.80	2.08	B.
February	2,250	650	1,090	1.32	1.38	B.
March	4,060	940	2,000	2.42	2.79	B.
April	3,180	1,020	1,760	2.13	2.38	B.
May	3,910	650	1,250	1.51	1.74	B.
June	21,400	860	3,290	3.97	4.43	B.
July	6,580	785	1,770	2.14	2.47	B.
August	2,010	650	1,050	1.27	1.46	B.
September	8,270	590	1,390	1.68	1.87	B.
October	1,480	590	813	.982	1.13	C.
November	3,910	650	1,600	1.93	2.15	B.
December	5,440	785	1,670	2.02	2.33	B.
The year	21,400	590	1,600	1.93	26.21	
1908.						
January	14,700	1,380	2,870	3.47	4.00	B.
February	5,620	1,280	2,040	2.46	2.65	B.
March	5,990	1,480	2,710	3.27	3.77	B.
April	10,100	1,020	2,420	2.92	3.26	B.
May	4,900	1,020	1,670	2.02	2.33	B.
June	3,040	650	1,230	1.49	1.66	B.
July	1,580	475	838	1.01	1.16	C.
August	940	370	499	.603	.70	C.
September	1,020	245	363	.438	.49	C.
October	1,790	245	440	.531	.61	C.
November	1,380	475	710	.857	.96	C.
December	7,620	1,100	2,220	2.68	3.09	B.
The year	14,700	245	1.500	1.81	24.68	

HOLSTON RIVER NEAR ROGERSVILLE, TENN.

This station is located at the Southern Railway bridge 1 mile north of Austins Mills and 3 miles south of Rogersville, Tenn. It was established by the United States Weather Bureau March 10, 1902, and all gage heights have been furnished by the Weather Bureau. The data from this station are useful in connection with general run-off and navigation problems.

The section of river is good for measurements, but the high-decked railroad bridge is dangerous to work from.

Daily gage height, in feet, of Holston River near Rogersville, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.0	2.2	4.0	2.8	2.8	2.2	2.7	2.6	1.9	2.4	1.7	2.8
2	4.7	2.6	5.5	3.0	2.7	2.7	2.5	2.4	1.8	2.4	1.7	2.7
3	4.0	2.7	6.0	2.8	2.7	5.6	2.4	2.0	1.9	2.3	2.6	2.6
4	3.7	2.8	5.1	2.6	3.2	5.9	2.4	2.0	2.0	2.3	2.6	2.5
5	3.5	3.3	4.3	2.6	3.2	4.6	2.3	2.0	2.0	2.4	2.4	2.4
6	3.4	3.6	3.8	3.8	3.2	3.9	2.2	2.0	2.4	2.9	2.3	2.3
7	3.3	3.2	3.5	4.4	4.2	3.3	2.2	2.0	2.0	2.7	2.2	2.3
8	3.2	3.0	3.6	4.7	5.4	4.0	2.3	2.7	2.6	2.4	2.2	2.2
9	3.0	2.9	3.7	4.3	4.4	5.0	2.2	2.6	2.8	2.4	2.1	2.2
10	2.9	2.8	4.0	5.0	3.8	5.2	2.0	3.2	2.4	2.5	3.4	2.4
11	2.8	2.7	4.4	4.4	3.4	4.7	2.4	2.8	2.7	2.2	5.3	3.4
12	2.7	2.7	5.1	3.9	3.4	8.4	2.8	2.4	2.7	2.1	4.8	4.0
13	2.6	2.6	4.6	3.7	3.0	5.6	4.2	1.9	2.8	2.1	3.8	3.3
14	2.5	2.5	4.0	3.6	2.9	10.7	4.4	2.2	2.4	2.0	3.3	3.1
15	2.5	2.5	4.4	3.5	2.8	14.0	4.3	2.2	2.2	1.9	2.8	3.1

Daily gage height, in feet, of Holston River near Rogersville, Tenn., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
16	2.4	2.4	4.6	3.2	2.7	6.0	3.4	2.1	2.0	1.9	2.7	3.4
17	2.4	2.4	4.2	3.2	2.6	4.7	3.4	2.0	2.0	1.9	2.6	3.4
18	2.6	2.3	3.9	3.4	2.5	4.0	3.2	2.5	1.9	1.8	2.6	3.2
19	2.8	2.3	3.8	3.4	2.4	3.6	3.0	3.3	1.8	1.8	2.9	3.0
20	4.0	2.3	3.4	3.4	2.4	3.3	3.0	2.8	1.8	1.8	3.0	2.8
21	3.8	2.2	3.1	3.4	2.3	3.2	2.7	2.5	1.8	1.7	3.0	2.7
22	3.4	2.3	3.1	3.3	2.2	3.0	2.5	2.3	2.7	1.7	2.9	2.6
23	3.2	2.2	3.0	3.3	2.2	2.9	2.4	2.1	4.5	1.7	2.9	2.7
24	3.0	2.2	2.9	4.0	2.2	2.9	2.3	2.4	9.0	1.7	4.6	3.4
25	2.8	3.3	2.7	3.8	2.2	3.3	2.3	2.7	5.2	1.7	5.3	3.6
26	2.8	3.6	2.7	3.5	2.2	2.9	2.4	2.8	3.8	1.6	4.6	3.3
27	2.7	3.8	2.6	3.4	2.3	2.9	2.4	2.4	3.2	1.6	3.9	3.1
28	2.6	3.8	2.6	3.3	2.3	2.6	3.0	2.3	2.8	1.8	3.4	2.8
29	2.5	.....	2.5	3.1	2.2	2.6	2.4	2.3	2.8	1.9	3.2	2.8
30	2.4	.....	2.5	2.9	2.1	2.6	2.9	2.2	2.7	2.0	2.9	4.5
31	2.3	.....	2.4	.....	2.1	.....	3.2	2.0	.....	1.8	.....	6.5
1908.												
1	5.3	3.1	3.3	3.6	3.2	3.3	2.3	2.4	2.0	1.5	3.4	3.0
2	4.3	3.4	4.5	6.4	3.1	2.9	2.5	2.3	1.9	1.5	2.9	3.7
3	3.8	3.2	5.0	12.7	2.9	2.7	2.8	2.0	1.9	1.5	2.6	3.6
4	3.4	2.8	4.6	7.1	2.9	2.7	2.5	1.9	1.9	1.5	2.2	3.0
5	4.2	2.8	4.3	5.3	2.8	4.0	3.0	1.8	1.8	1.4	2.2	2.8
6	5.0	3.2	5.7	4.6	2.8	4.8	3.2	1.9	2.1	1.4	2.1	2.6
7	4.3	3.5	6.6	4.3	3.4	3.7	3.4	2.0	2.5	1.4	2.0	3.9
8	4.0	3.7	5.2	3.9	4.9	3.2	3.3	2.0	2.5	1.4	2.0	7.3
9	3.8	3.3	4.5	3.8	4.8	2.9	4.3	2.1	2.1	1.4	1.9	5.6
10	3.3	3.2	4.0	3.6	4.0	2.8	3.3	2.4	2.0	1.6	1.8	4.2
11	3.2	3.5	3.8	3.3	3.7	2.8	2.9	2.4	1.9	2.3	1.8	3.6
12	4.3	3.5	4.3	3.3	3.5	2.7	2.6	2.1	1.9	2.1	2.3	3.7
13	11.5	4.0	4.8	3.2	3.3	2.6	2.4	2.0	1.8	1.8	2.6	4.0
14	6.6	5.7	4.5	3.0	3.1	2.5	2.3	1.9	1.8	1.7	2.3	4.0
15	5.1	6.8	4.3	2.9	3.0	2.7	2.4	1.9	1.8	1.6	2.3	3.6
16	4.3	8.8	4.0	3.2	2.8	3.8	2.4	1.8	1.7	1.5	2.3	3.2
17	4.2	6.0	3.9	3.3	2.7	3.3	2.4	1.8	1.7	1.5	2.2	3.0
18	4.0	4.8	3.7	3.3	2.8	2.9	2.2	1.8	1.7	1.4	2.1	2.8
19	3.8	4.0	4.1	3.2	2.8	2.7	2.4	1.7	1.6	1.4	2.1	2.7
20	3.6	3.9	4.0	3.2	3.6	2.6	2.3	2.0	1.5	1.4	2.1	2.7
21	3.4	3.7	4.8	3.1	3.7	2.4	2.2	2.0	1.5	1.4	2.3	2.6
22	3.3	3.3	4.8	2.9	4.0	2.5	2.1	2.9	1.5	1.4	2.2	3.3
23	3.2	3.3	4.8	2.7	3.5	2.4	2.6	2.1	1.5	1.5	2.1	5.8
24	3.3	3.2	5.2	2.6	3.3	3.8	2.2	2.1	1.5	1.5	2.0	4.7
25	3.2	3.0	5.5	2.8	3.0	3.4	2.1	2.2	1.5	3.6	2.0	4.0
26	3.2	3.0	5.0	6.5	2.9	3.4	2.0	2.3	1.4	2.6	1.9	3.9
27	3.2	3.3	4.3	5.5	2.9	3.0	2.0	3.4	1.4	2.3	1.9	4.6
28	3.5	3.1	4.0	4.3	2.8	2.7	1.9	2.8	1.4	2.0	1.8	4.2
29	3.3	2.9	3.7	3.7	2.8	2.5	2.7	2.4	1.6	2.5	1.8	4.0
30	3.2	.....	3.6	3.4	3.8	2.4	2.4	2.2	1.5	3.2	2.0	4.0
31	3.0	.....	3.5	.....	4.0	.....	3.2	2.1	.....	3.6	.....	4.2

Rating table for Holston River near Rogersville, Tenn., for 1906 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.40	1,140	2.90	4,410	4.40	9,120	6.60	17,800
1.50	1,320	3.00	4,670	4.50	9,490	6.80	18,600
1.60	1,510	3.10	4,940	4.60	9,860	7.00	19,400
1.70	1,700	3.20	5,220	4.70	10,240	7.20	20,200
1.80	1,900	3.30	5,510	4.80	10,620	7.40	21,000
1.90	2,100	3.40	5,800	4.90	11,010	7.60	21,800
2.00	2,310	3.50	6,100	5.00	11,400	7.80	22,600
2.10	2,520	3.60	6,410	5.20	12,200	8.00	23,400
2.20	2,740	3.70	6,720	5.40	13,000	9.00	27,400
2.30	2,960	3.80	7,040	5.60	13,800	10.00	31,400
2.40	3,190	3.90	7,370	5.80	14,600	11.00	35,400
2.50	3,420	4.00	7,710	6.00	15,400	12.00	39,400
2.60	3,660	4.10	8,050	6.20	16,200	13.00	43,400
2.70	3,900	4.20	8,400	6.40	17,000	14.00	47,400
2.80	4,150	4.30	8,760				

NOTE.—The above table is applicable only for open-channel conditions. It is based upon seven discharge measurements made during 1904 to 1906 and is well defined between gage heights 1.0 foot and 6.0 feet. Above gage height 5.0 feet the rating curve is a tangent, the difference being 400 per tenth.

Monthly discharge of Holston River near Rogersville, Tenn., for 1907 and 1908.

[Drainage area 3,060 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	11,400	2,960	5,040	1.65	1.90	A.
February	7,040	2,740	4,130	1.35	1.41	A.
March	15,400	3,190	7,140	2.33	2.69	A.
April	11,400	3,660	6,290	2.06	2.30	A.
May	13,000	2,520	4,440	1.45	1.67	A.
June	47,400	2,740	10,300	3.37	3.76	B.
July	9,120	2,310	4,200	1.37	1.58	A.
August	5,510	2,100	3,170	1.04	1.20	A.
September	27,400	1,900	4,500	1.47	1.64	A.
October	4,410	1,510	2,430	.794	.92	A.
November	12,600	1,700	5,320	1.74	1.94	A.
December	17,400	2,740	5,060	1.65	1.90	A.
The year	47,400	1,510	5,170	1.69	22.91	
1908.						
January	37,400	4,670	8,440	2.76	3.18	A.
February	26,600	4,150	7,610	2.49	2.68	A.
March	17,800	5,510	9,460	3.09	3.56	A.
April	42,200	3,660	8,750	2.86	3.19	B.
May	11,000	3,900	5,670	1.85	2.13	A.
June	10,600	3,190	4,790	1.57	1.75	A.
July	8,760	2,100	3,720	1.22	1.41	A.
August	5,800	1,700	2,670	.873	1.01	A.
September	3,420	1,140	1,850	.605	.68	A.
October	6,410	1,140	2,080	.680	.78	A.
November	5,800	1,900	2,710	.886	.99	A.
December	20,600	3,660	7,370	2.41	2.78	A.
The year	42,200	1,140	5,430	1.77	24.14	

NOTE.—The above estimates of accuracy are dependent upon permanency of conditions of flow since the last measurements were made in 1906.

MIDDLE FORK OF HOLSTON RIVER AT CHILHOWIE, VA.

The Middle Fork of Holston River rises a little to the south of the village of Old Mount Airy, Va., on the western slope of the Blue Ridge, in the valley between Walker Mountain on the north and the Brushy Mountains on the south, and flows in a direction generally parallel to the course of the South Fork until a few miles above the junction, where it turns to the southwest. Below the junction, the stream continues its general southwesterly course, and after being joined by the Watauga, it unites with the North Fork of Holston River, near the town of Kingsport, Tenn., forming Holston River. The area drained by the Middle Fork lies mostly to the north of the river, the distance from the summit of the ridge dividing its watershed from that of the South Fork to the stream being too small to permit of the formation of streams of considerable size. The country is similar in general character to the area drained by the South Fork below the junction, the topography consisting of small and rounded hills and ridges, grass-covered to the top, with very gentle slopes and with low divides between the small creek watersheds. The soil is seemingly very fertile and is light and porous, though some areas of clay were found. Limestone is the country rock, and the bed of the river is also in that stone.

The gaging station is located in Chilhowie at the new iron highway bridge. It was established June 8, 1907, to obtain data for use in connection with southern Appalachian water resources investigations, and for supplying general flow data in the upper Holston drainage.

Discharge measurments are made from the single-span bridge where the current is good and the channel conditions favor accurate work.

Discharge measurements of Middle Fork of Holston River at Chilhowie, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 8	Warren E. Hall	135	487	4.47	1,780
August 12	B. M. Hall, jr	130	88	1.44	112
August 13	Warren E. Hall	130	90	1.50	140
Do	B. M. Hall, jr., and Warren E. Hall	130	90	1.50	141
September 9	B. M. Hall, jr	127	78	1.39	101
1908.					
February 20	Warren E. Hall	120	202	1.84	320
July 4	F. P. Thomas	117	146	1.43	130
July 7	do	117	150	1.40	146
Do	Warren E. Hall	117	150	1.40	144

Daily gage height, in feet, of Middle Fork of Holston River at Chilhowie, Va., for 1907 and 1908.

[Observer, W. G. Baylor.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.6	1.5	1.5	1.4	1.4	1.8
2							1.6	1.4	1.4	1.3	1.3	1.7
3							1.5	1.5	1.3	1.2	1.2	1.5
4							1.5	1.5	1.6	1.4	1.3	1.4
5							1.5	1.4	1.4	1.5	1.5	1.6
6							1.6	1.5	1.4	1.4	1.4	1.5
7							1.6	1.3	1.6	1.6	1.5	1.6
8							1.5	1.4	1.4	1.7	1.6	1.8
9							1.5	1.5	1.5	1.4	1.7	1.7
10						2.2	3.05	1.6	1.4	1.3	2.4	1.6
11						10.2	1.8	1.6	1.3	1.4	2.6	1.8
12						3.8	3.6	1.7	1.6	1.5	1.9	1.5
13							2.6	1.5	1.4	1.3	1.8	1.6
14						7.5	1.9	1.6	1.6	1.3	1.6	1.4
15						4.3	1.8	1.5	1.4	1.4	1.7	1.5
16						2.9	2.2	1.7	1.6	1.5	1.4	1.6
17						2.5	1.9	1.6	1.5	1.3	1.5	1.8
18						2.1	1.9	1.7	1.5	1.4	1.6	1.7
19						2.0	1.8	1.8	1.3	1.3	1.8	1.6
20						1.9	2.0	1.7	1.3	1.2	1.6	1.5
21						1.9	1.7	1.5	1.5	1.3	1.4	1.4
22						1.9	1.7	1.6	1.6	1.4	1.3	1.3
23						1.9	1.6	1.5		1.3	1.5	1.4
24						1.9	1.6	1.6	2.4	1.3	1.7	1.5
25						1.9	1.5	1.5	1.8	1.4	1.8	1.6
26						1.8	1.7	1.5	1.6	1.3	1.6	1.5
27						1.7	1.9	1.7	1.5	1.4	1.6	1.6
28						1.6	1.6	1.6	1.3	1.5	1.7	1.9
29						2.0	1.5	1.4	1.4	1.6	1.9	1.5
30						1.8	1.7	1.5	1.3	1.5	2.0	1.6
31							1.6	1.4		1.4		1.7

Daily gage height, in feet, of Middle Fork of Holston River at Chilhowie, Va., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	1.4	1.8	2.2	5.1	1.9	1.6	2.7	2.1	2.2	1.3	1.3	1.3
2	1.5	1.9	2.4	5.2	1.9	1.6	2.6	2.4	2.1	1.3	1.3	1.2
3	1.5	2.3	2.2	4.5	1.8	1.6	2.6	2.3	2.1	1.3	1.3	1.2
4	1.6	2.8	2.0	4.0	1.8	3.2	2.6	2.3	2.1	1.3	1.3	1.2
5	2.8	.....	2.2	3.4	1.8	2.6	2.6	2.2	2.1	1.3	1.3	1.2
6	2.5	.....	3.9	3.4	1.7	2.4	2.6	2.2	2.5	1.3	1.4	1.2
7	2.0	2.9	2.7	3.7	1.7	2.0	2.4	2.1	2.4	1.3	1.4	3.3
8	1.8	2.5	2.5	3.3	1.7	1.8	2.4	2.1	2.4	1.3	1.3	3.5
9	1.5	1.9	2.4	3.0	1.8	1.8	2.4	2.3	2.3	1.3	1.3	3.2
10	1.5	1.8	2.2	2.9	1.6	1.7	2.3	2.7	2.3	1.2	1.3	3.1
11	1.5	1.9	2.1	2.9	1.5	1.7	2.3	2.5	2.2	1.2	1.3	3.1
12	.....	1.8	2.15	2.8	1.5	1.7	2.3	2.4	2.2	1.2	1.3	3.0
13	3.2	2.4	2.1	2.8	1.6	1.6	2.2	2.3	2.2	1.2	1.3	2.9
14	2.9	2.8	2.0	2.8	1.6	1.6	2.2	2.3	2.2	1.2	1.3	2.9
15	2.5	2.9	2.0	2.7	1.5	1.6	2.1	2.2	2.2	1.2	1.2	2.7
16	1.9	2.2	2.0	2.7	1.5	1.5	2.1	2.6	2.2	1.2	1.2	2.6
17	1.6	2.0	2.0	2.7	1.4	1.5	2.5	2.4	2.1	1.2	1.2	2.8
18	1.5	2.0	1.9	2.7	1.5	1.4	2.7	2.2	2.1	1.1	1.1	2.7
19	1.5	1.9	1.9	2.3	1.6	1.4	2.6	2.2	2.1	1.2	1.1	2.6
20	1.7	2.0	1.8	2.0	1.7	1.7	2.5	2.2	2.1	1.2	1.1	2.5
21	1.8	1.9	1.8	1.9	1.7	1.8	2.5	2.1	2.1	1.2	1.1	2.5
22	1.5	1.8	1.8	1.8	1.6	1.7	2.4	2.1	2.1	1.2	1.0	2.4
23	1.4	1.8	1.7	1.7	1.6	2.5	2.4	2.1	2.0	1.1	1.0	2.3
24	1.5	1.7	1.7	1.7	1.8	2.1	2.3	2.4	1.9	1.2	1.0	2.3
25	1.5	1.7	1.8	1.7	2.1	1.9	2.3	2.6	1.9	1.2	1.0	2.2
26	1.5	1.8	1.8	2.7	1.9	1.8	2.3	2.7	1.8	1.2	1.0	2.4
27	1.6	1.8	1.8	2.3	1.8	1.7	2.2	2.6	1.7	1.2	1.0	2.4
28	1.7	1.8	1.8	2.2	1.7	1.7	2.2	2.5	1.7	1.4	1.0	3.6
29	1.9	1.7	1.8	2.0	1.7	1.6	2.1	2.5	1.6	1.5	1.0	3.7
30	1.8	.....	2.2	2.0	1.8	1.6	2.1	2.4	1.6	1.4	1.3	3.5
31	1.8	.....	4.85	.....	1.8	.....	2.1	2.2	.....	1.3	.....	3.3

WATAUGA RIVER NEAR ELIZABETHTON, TENN.

Watauga River rises on the northern and eastern slopes of Grandfather Mountain, on the southern boundary of Watauga County, N. C., and after flowing about 6 miles in a northeasterly direction is joined by Boone Fork, a stream which rises on the eastern slope of Grandfather Mountain and flows first due east about 4 miles and then to the north about 4 miles, or to its junction with the Watauga. At the junction the river changes its course to the northwest, and with many bends, rapids, and falls, flows through Watauga County, N. C., and Johnson and Carter counties, Tenn., uniting its waters with those of the South Fork of Holston River about 9 miles northwest of Johnson City. In its course it is joined by many tributaries. It drains an extensive area, a large part of which lies in the high mountains.

Like all other drainage basins throughout this region, the basin of the Watauga is subject to a very heavy annual rainfall, being greater near the headwaters, where there is an almost constant precipitation. This rainfall at times comes in the form of violent rainstorms, but these are infrequent, the precipitation being equally well distributed throughout the entire year, though the summer rainfall is the great-

est in amount. At times the heavy rains are long continued, lasting a week or more, and the streams rise to great heights and do a vast amount of damage. Droughts are infrequent, and as a rule are neither severe or long continued, the drought of 1904 being probably the most severe within the memory of the inhabitants of the basin.

A marked feature of the region is the great number of springs, the discharge of which ranges from less than a gallon a minute up, several being of very large size. One of the larger springs is in the village of Allentown, Tenn. The spring basin is nearly 100 feet in diameter and has a discharge estimated at from 8 to 10 cubic feet per second. Another large spring is directly on the bank of the river, at the town of Fishspring. Here there are a number of small springs flowing from crevices in the rock, the aggregate volume being 7 or 8 cubic feet per second.

The fall of the Watauga is very great throughout its entire length, and the selection of shoals for utilization would be largely a matter of convenience, the average fall of the stream in Tennessee being about 15 feet to the mile, and between Shulls Mill and the Tennessee line about 47 feet to the mile, with many small stretches where the fall is much greater.

The gaging station is located on the Virginia and Southwestern Railway bridge at Siam, about 4 miles from Elizabethton, Tenn. It was established May 11, 1903, for the purpose of supplying run-off data useful in estimating water power, which is very abundant in parts of this river. It is 1½ miles above the mouth of Stony Creek and 5 miles above Doe River.

Excepting the rather sluggish current of low stages, the conditions are good for measurements of discharge.

No change in the location or datum of the gage has occurred.

This station was discontinued December 31, 1908.[a]

Discharge measurements of Watauga River near Elizabethton, Tenn., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. feet.*	*Feet.*	*Sec.-ft.*
June 18	Warren E. Hall	212	874	2.48	1,180
August 10	do	209	717	1.77	570
1908.					
February 26	Warren E. Hall	208	722	2.18	914

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Watauga River near Elizabethton, Tenn., for 1907 and 1908.

[Observer, J. B. Nave.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.4	1.6	2.6	1.65	1.9	1.8	.....	1.7	1.5	1.9	1.45	.....
2	3.0	1.55	2.9	1.6	1.9	5.5	1.8	1.65	1.7	1.8	.....	1.85
3	2.65	1.55	2.7	1.6	1.9	4.9	1.75	1.6	1.75	1.6	1.4	1.7
4	2.4	1.55	2.65	1.7	2.0	3.7	.....	1.6	1.7	1.7	1.4	1.6
5	2.25	1.6	2.6	1.75	2.1	3.1	1.65	1.6	.....	2.5	1.4	1.55
6	2.2	1.6	2.55	1.8	2.1	2.7	1.6	1.6	1.6	2.3	1.35	1.55
7	2.2	1.55	2.5	1.9	2.0	2.6	1.6	1.65	1.55	.....	1.3	1.5
8	2.15	1.55	2.4	1.95	1.95	3.5	1.55	1.7	1.65	1.7	1.3	.....
9	2.1	1.55	2.6	2.0	1.9	3.4	1.5	1.75	1.7	1.65	1.35	1.5
10	2.0	1.5	2.8	2.3	1.8	3.3	1.5	1.75	1.7	1.65	1.8	1.5
11	1.95	.....	3.1	2.2	1.75	3.1	1.6	1.7	1.65	1.6	2.3	1.45
12	1.85	1.5	2.9	2.2	1.75	2.9	1.8	1.6	2.4	1.55	2.0	1.5
13	1.8	1.5	2.6	2.15	1.7	2.7	2.3	1.5	1.95	1.5	1.9	1.6
14	1.7	1.5	2.5	2.1	1.65	5.0	3.2	1.45	1.7	1.5	1.8	2.3
15	1.7	.....	2.45	2.1	1.6	3.3	2.3	1.4	.....	1.5	1.7	2.6
16	1.65	.....	2.4	2.1	1.55	.....	2.3	1.3	1.6	1.45	1.65	2.6
17	1.6	1.5	2.3	2.2	1.5	2.5	2.3	1.8	1.55	1.45	1.65	2.5
18	1.7	1.5	2.25	2.2	1.45	2.5	2.2	1.9	1.5	1.45	1.65	2.35
19	1.8	1.5	2.2	2.3	1.5	2.45	2.1	1.85	1.5	1.4	1.6	2.1
20	1.75	1.5	2.0	2.25	1.6	2.4	2.1	1.75	.....	1.4	1.6	2.0
21	1.75	1.5	1.95	2.2	1.55	2.4	.....	1.65	1.7	1.4	1.6	1.8
22	1.7	1.6	1.9	2.3	1.55	2.35	2.05	1.6	1.8	1.35	.....	1.9
23	1.7	1.75	1.85	3.0	1.6	.....	2.00	1.75	5.2	1.35	2.0	4.5
24	1.65	2.2	1.8	2.9	1.65	2.2	1.9	1.8	4.8	1.3	2.4	4.4
25	1.6	2.3	1.8	2.5	1.6	1.9	1.85	1.75	3.8	1.3	2.5	4.2
26	1.6	2.85	1.75	2.3	1.6	2.6	1.8	1.7	3.5	1.3	2.5	4.0
27	1.6	2.4	1.75	2.2	1.5	2.9	1.75	1.65	3.2	1.3	2.35	3.6
28	1.6	2.6	1.7	2.15	1.5	2.3	1.7	1.6	2.9	1.3	2.25	3.0
29	1.55	.....	1.7	2.1	1.4	2.1	2.0	1.6	2.8	.....	2.1	2.7
30	1.5	.....	1.65	2.0	1.4	.....	1.9	1.55	2.4	1.5	2.0	3.6
31	1.5	.....	1.7	.....	1.5	.....	1.9	1.55	.....	1.5	.....	3.5
1908.												
1	3.1	2.1	.....	2.4	2.3	2.0	2.4	2.05	1.7	1.2	.....	1.8
2	2.5	2.05	3.9	5.6	2.2	1.9	2.05	.....	1.7	1.05	2.5	2.1
3	.....	2.0	3.6	4.3	.....	1.8	2.05	1.7	1.6	1.05	2.2	2.0
4	2.2	2.1	3.1	3.3	2.05	2.4	3.0	1.6	1.6	.....	2.05	1.8
5	3.3	.....	.....	.....	2.0	2.6	.....	1.8	1.6	1.05	2.0	1.8
6	3.0	2.15	.....	2.8	2.0	2.3	2.6	1.8	.....	1.05	1.8	.....
7	.....	2.1	.....	2.5	2.3	.....	2.7	1.7	1.7	1.05	1.8	5.4
8	2.35	2.05	.....	2.3	2.6	2.0	4.7	1.7	1.7	1.05	.....	3.7
9	2.3	.....	.....	2.3	2.5	1.9	3.1	.....	1.5	1.2	1.7	3.0
10	2.2	2.0	.....	2.2	.....	1.8	2.8	1.7	1.5	2.8	1.6	2.5
11	2.15	2.0	.....	2.05	2.3	1.8	2.4	1.6	1.5	.....	1.7	2.3
12	8.1	2.6	.....	.....	2.05	1.7	.....	1.5	1.4	1.5	1.8	2.6
13	6.1	4.0	.....	2.0	2.0	1.7	2.0	1.5	.....	1.4	1.7	.....
14	3.6	4.5	.....	1.9	2.0	.....	1.9	1.4	1.4	1.4	1.8	2.5
15	3.4	6.5	.....	1.9	1.9	3.0	1.9	1.4	1.4	1.3	.....	.....
16	3.2	.....	2.5	2.7	1.9	2.4	1.9	.....	1.4	1.3	1.8	.....
17	2.7	3.5	2.3	2.6	.....	2.05	1.7	1.4	1.4	1.3	1.8	2.1
18	2.6	3.0	2.4	2.8	2.1	1.8	1.6	1.4	1.3	.....	1.8	.....
19	2.55	2.8	2.1	.....	2.8	1.7	.....	1.4	1.3	1.2	1.9	2.1
20	2.4	2.5	2.5	2.3	2.7	1.7	1.6	2.05	.....	1.2	1.8	.....
21	2.3	2.05	2.6	2.2	2.8	.....	1.5	1.7	1.3	1.2	1.8	1.9
22	2.25	2.4	.....	.....	2.5	1.7	2.4	1.8	1.3	1.2	.....	1.5
23	.....	.....	3.0	2.0	2.2	2.9	1.9	.....	1.3	3.4	1.7	2.9
24	2.2	2.05	3.8	1.9	.....	2.05	1.8	1.3	1.2	4.5	1.7	2.7
25	2.1	2.05	3.3	2.5	2.1	2.5	1.5	2.5	1.1	.....	1.6	.....
26	2.1	2.1	2.9	.....	2.0	2.05	.....	3.8	1.1	2.3	1.6	3.0
27	3.0	2.0	2.6	3.3	2.1	1.9	1.5	2.9	.....	2.0	1.6	.....
28	2.8	1.8	2.5	2.9	2.1	.....	2.1	2.5	1.2	2.0	1.0	2.6
29	2.3	2.05	.....	2.5	2.1	1.7	3.6	2.1	1.5	3.3	.....	2.7
30	2.2	.....	2.4	2.4	2.8	1.7	3.6	.....	1.4	3.8	1.6	2.8
31	2.15	.....	2.1	.....	.....	.....	2.5	1.8	.....	3.1	.....	3.1

Rating table for Watauga River near Elizabethton, Tenn., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.00	155	2.50	1,180	4.00	2,850	6.00	5,840
1.10	195	2.60	1,275	4.10	2,980	6.20	6,180
1.20	240	2.70	1,370	4.20	3,110	6.40	6,520
1.30	290	2.80	1,470	4.30	3,250	6.60	6,860
1.40	345	2.90	1,570	4.40	3,390	6.80	7,200
1.50	400	3.00	1,675	4.50	3,530	7.00	7,540
1.60	460	3.10	1,780	4.60	3,670	7.20	7,900
1.70	525	3.20	1,890	4.70	3,820	7.40	8,260
1.80	595	3.30	2,000	4.80	3,970	7.60	8,620
1.90	670	3.40	2,115	4.90	4,120	7.80	8,980
2.00	750	3.50	2,230	5.00	4,270	8.00	9,340
2.10	830	3.60	2,350	5.20	4,570	8.20	9,720
2.20	915	3.70	2,470	5.40	4,880		
2.30	1,000	3.80	2,595	5.60	5,200		
2.40	1,090	3.90	2,720	5.80	5,520		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on three discharge measurements made during 1907 and 1908, earlier highwater measurements, and the form of previous low-water curves, and is fairly well defined between gage heights 1.7 feet and 4.0 feet. Above gage height 3.9 feet the table is the same as the 1906 table.

Monthly discharge of Watauga River near Elizabethton, Tenn., for 1907 and 1908.

[Drainage area, 408 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,120	400	717	1.76	2.03	B.
February	1,520	400	557	1.37	1.43	B.
March	1,780	492	1,000	2.45	2.82	A.
April	1,680	460	864	2.12	2.36	B.
May	830	345	530	1.30	1.50	B.
June	5,040	595	1,680	4.12	4.60	A.
July	1,890	400	708	1.74	2.01	B.
August	670	290	494	1.21	1.40	B.
September	4,570	400	1,030	2.52	2.81	A.
October	1,180	290	457	1.12	1.29	B.
November	1,180	290	612	1.50	1.67	B.
December	3,530	372	1,210	2.97	3.42	A.
The year	5,040	290	822	2.02	27.34	
1908.						
January	9,530	830	1,680	4.12	4.75	A.
February	6,690	595	1,430	3.50	3.78	A.
April	5,200	670	1,350	3.31	3.69	A.
May	1,470	670	959	2.35	2.71	A.
June	1,680	525	797	1.95	2.18	B.
July	3,820	400	1,060	2.60	3.00	A.
August	2,600	290	657	1.61	1.86	B.
September	525	195	360	.882	.98	B.
October	3,530	175	777	1.90	2.19	B.
November	1,480	155	608	1.49	1.66	B.
December	4,880	400	1,320	3.24	3.74	A.

DOE RIVER AT ELIZABETHTON, TENN.

The most important tributary received by Watauga River is Doe River, which rises in the high and mountainous area to the west and north of Roan High Knob, and flows in a general northerly and northwesterly direction, joining the Watauga at Elizabethton, Tenn. Near the mouth of the stream, probably one-fourth or more of the valley is cleared land, the cleared areas being the level bottom or terrace land immediately along the river; but about 2 miles above

Elizabethton the gorge of the Doe begins, and from that point to Allentown the river flows in a very narrow channel carved out by its waters from the solid rock, which rises on either side in precipitous walls several hundred feet high. Near Allentown, where Doe River is joined by the Laurel Fork and Little Doe River, there is a considerable area of open and level land rimmed about by high and steep mountains. Above that place the gorge of the Doe becomes more pronounced, the sides rising higher and more steeply above the water, and the scenery, though confined, is very much grander than that of the lower gorge.

The gaging station was established at the wagon bridge in Elizabethton on June 15, 1907, as part of the southern Appalachian water-resources investigation.

Discharge measurements are made from the covered wooden bridge, where the current is sluggish owing to a low dam below. The gage was located 1,500 feet above the bridge in an attempt to get above the backwater from this dam. The general conditions are poor and the station was discontinued on June 30, 1908.[a]

Discharge measurements of Doe River at Elizabethton, Tenn., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 17	Warren E. Hall	129	285	1.50	403
August 9	do	127	283	1.60	504
September 5	B. M. Hall, jr	125	243	1.48	357
Do	do	125	242	1.43	334

Daily gage height, in feet, of Doe River at Elizabethton, Tenn., for 1907 and 1908.

[Observer, Mary Perry.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							0.9	0.9	0.85	1.0	0.65	0.85
2							1.15	.9	.8	1.0	.7	.75
3							1.0	.8	.8	.9	.75	.75
4							.9	.8	1.75	.9	.75	.8
5							.9	.8	1.65	.8	.7	.9
6							.9	.9	1.1	.8	.6	1.0
7							.9	.9	1.0	.8	.52	1.2
8							.8	1.0	2.0	.9	.6	1.25
9							.8	1.45	1.4	.85	.75	.95
10							.8	1.0	1.05	.8	1.35	2.0
11							.8	1.0	1.0	.8	1.25	1.75
12							1.8	1.0	1.0	.8	.95	.85
13							1.6	.9	.95	.8	.82	.95
14							1.3	.8	.9	.8	.75	1.45
15						2.0	1.1	.7	.9	.75	.65	.8
16						1.7	1.0	.75	.8	.7	.6	.95
17						1.55	1.75	1.05	.8	.7	.65	1.15
18						1.45	1.15	.9	.75	.8	.68	1.3
19						1.4	1.1	.9	.7	.8	.6	1.0
20						1.3	.95	.7	.7	.8	.7	.85

[a] Records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Doe River at Elizabethton, Tenn., for 1907 and 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21						1.6	0.9	0.75	1.0	0.9	0.65	1.0
22						1.05	.8	2.3	1.3	.8	.5	1.35
23						1.05	.8	2.35	3.6	.8	.5	1.45
24						1.1	.8	1.95	1.9	.8	1.3	1.7
25						1.35	.9	1.15	1.5	.8	1.4	1.85
26						1.1	.8	1.0	1.15	.8	1.25	1.45
27						1.0	.9	1.0	1.1	.8	1.15	1.2
28						1.35	.8	1.0	1.0	.85	.9	1.55
29						1.05	1.65	1.0	1.0	.75	.75	1.75
30							1.2	.95	.9	.7	.65	1.15
31							.95	.9		.65		1.6

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	1.7	1.45	1.95	2.0	1.3	1.1	16	1.5	2.0	1.4	1.6	1.0	1.55
2	1.65	1.2	1.65	2.55	2.0	1.1	17	1.4	1.55	1.2	1.5	1.0	1.3
3	1.3	1.15	1.55	1.7	1.2	1.05	18	1.35	1.2	1.25	1.35	1.25	1.1
4	1.1	1.1	1.5	1.5	1.1	1.5	19	1.25	1.2	1.2	1.2	1.8	1.0
5	1.95	1.1	1.8	1.3	1.1	1.25	20	1.0	1.05	1.25	1.2	2.0	1.0
6	2.0	1.3	1.95	1.3	1.1	1.2	21	1.0	1.0	1.5	1.15	1.6	1.3
7	1.8	1.1	1.7	1.2	1.7	1.1	22	1.0	1.0	1.5	1.1	1.25	1.6
8	1.45	1.1	1.5	1.2	1.45	1.1	23	1.2	1.0	1.7	1.1	1.2	1.45
9	1.25	1.1	1.45	1.2	1.35	1.0	24	1.1	1.1	2.05	1.1	1.1	1.4
10	1.1	1.1	1.2	1.1	1.3	1.0	25	1.0	1.1	1.75	2.65	1.1	1.5
11	1.3	1.2	1.2	1.1	1.2	.85	26	1.0	1.1	1.6	2.0	1.1	1.45
12	3.8	1.35	1.85	1.1	1.1	.8	27	1.1	1.1	1.35	1.65	1.1	1.4
13	2.85	1.65	1.55	1.1	1.1	.8	28	1.1	1.1	1.3	1.45	1.2	1.2
14	2.5	1.7	1.55	1.1	1.0	1.25	29	1.1	1.2	1.3	1.4	1.2	1.1
15	1.6	3.0	1.45	1.0	1.0	1.85	30	1.0		1.2	1.35	1.2	1.0
							31	1.0		1.2		1.15	

NORTH FORK OF HOLSTON RIVER AT SALTVILLE, VA.

This station is located at the highway bridge about one-half mile from Saltville. It was established June 11, 1907, for cooperation with the Forest Service, for the purpose of investigating the water resources of the southern Appalachian Mountains. The station is just above Little Tumbling Creek and about 2 miles above Sturgeon Creek.

Discharge measurements are made from the single-span bridge, where the current is rough and broken and in places becomes sluggish at low stages, making it rather bad for measurements.

The gage chain was lost on November 12, 1908, and the station was abandoned.

Discharge measurements of North Fork of Holston River at Saltville, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 12	Warren E. Hall	145	550	5.86	1,940
August 10	B. M. Hall, jr	72	132	2.10	133
August 14	do	70	107	1.97	84
Do	Warren E. Hall	70	111	1.97	94
September 10	B. M. Hall, jr	44	83	1.61	46
Do	do	44	83	1.61	48
1908.					
February 22	Warren E. Hall	110	260	3.35	406
July 3	F. P. Thomas	85	159	2.29	174
Do	Warren E. Hall	85	162	2.29	177

Daily gage height, in feet, of North Fork of Holston River at Saltville, Va., for 1907 and 1908.

[Observer, T. A. Hockett.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	.....	.....	2.55	2.3	2.0	2.9
2	.....	.....	.....	.....	.....	.....	.....	.....	2.1	2.2	2.4	2.8
3	.....	.....	.....	.....	.....	.....	.....	.....	2.05	2.1	2.9	2.75
4	.....	.....	.....	.....	.....	.....	.....	.....	2.0	2.25	2.8	2.55
5	.....	.....	.....	.....	.....	.....	.....	.....	1.9	2.4	2.55	2.5
6	.....	.....	.....	.....	.....	.....	.....	.....	1.85	2.5	2.5	2.35
7	.....	.....	.....	.....	.....	.....	.....	.....	1.8	2.35	2.3	2.3
8	.....	.....	.....	.....	.....	.....	.....	.....	1.8	2.4	2.3	2.3
9	.....	.....	.....	.....	.....	.....	.....	.....	1.75	2.25	2.2	2.25
10	.....	.....	.....	.....	.....	.....	.....	.....	1.7	2.15	5.2	4.6
11	.....	.....	.....	.....	.....	8.5	.....	.....	2.3	2.1	4.7	5.9
12	.....	.....	.....	.....	.....	5.8	.....	.....	2.5	2.05	4.0	4.3
13	.....	.....	.....	.....	.....	9.5	.....	.....	2.35	2.0	3.4	3.7
14	.....	.....	.....	.....	.....	9.8	.....	2.0	2.05	1.95	3.05	3.8
15	.....	.....	.....	.....	.....	6.0	.....	1.9	2.0	1.9	2.8	3.9
16	.....	.....	.....	.....	.....	4.9	.....	1.9	1.9	1.8	2.45	3.8
17	.....	.....	.....	.....	.....	4.2	.....	1.95	1.85	1.8	2.4	3.75
18	.....	.....	.....	.....	.....	3.85	.....	2.45	1.6	1.8	3.6	3.65
19	.....	.....	.....	.....	.....	3.6	.....	2.45	2.75	1.8	3.8	3.35
20	.....	.....	.....	.....	.....	3.6	.....	2.4	2.35	1.8	3.6	3.15
21	.....	.....	.....	.....	.....	3.5	.....	2.1	2.05	1.8	3.55	3.05
22	.....	.....	.....	.....	.....	3.4	.....	2.1	2.55	1.8	3.4	3.0
23	.....	.....	.....	.....	.....	3.3	.....	2.0	5.4	1.8	3.35	2.9
24	.....	.....	.....	.....	.....	3.8	.....	2.25	4.4	1.8	4.6	2.9
25	.....	.....	.....	.....	.....	3.2	.....	2.3	3.35	1.8	4.8	2.75
26	.....	.....	.....	.....	.....	3.05	.....	2.25	3.0	1.8	4.2	2.7
27	.....	.....	.....	.....	.....	2.9	.....	2.2	2.65	1.8	3.8	2.6
28	.....	.....	.....	.....	.....	2.8	.....	2.2	2.5	1.9	3.4	2.6
29	.....	.....	.....	.....	.....	.....	.....	2.1	2.5	1.9	3.1	3.45
30	.....	.....	.....	.....	.....	.....	.....	2.0	2.4	1.9	3.0	4.4
31	.....	.....	.....	.....	.....	.....	.....	2.0	.....	1.9	.....	5.2
1908.												
1	4.0	3.05	3.7	7.9	3.2	3.0	2.6	1.75	1.85	1.6	2.7	.....
2	3.65	3.15	5.0	9.7	3.15	2.85	2.4	1.7	1.75	1.6	2.5	.....
3	3.2	3.05	4.5	5.9	3.0	2.7	2.35	1.75	1.7	1.6	2.2	.....
4	3.2	3.15	4.2	4.9	3.0	4.3	2.3	1.7	1.7	1.55	2.15	.....
5	3.5	3.15	4.4	4.2	3.0	5.7	2.45	1.7	2.8	1.5	2.05	.....
6	3.15	3.45	6.4	6.0	2.95	4.2	2.55	1.7	3.85	1.55	2.0	.....
7	3.05	3.65	5.2	3.65	5.7	3.7	2.45	1.7	2.75	1.55	2.05	.....
8	3.65	3.45	4.4	3.5	5.4	3.3	2.3	1.8	2.25	1.6	2.0	.....
9	3.35	3.25	4.0	3.4	4.5	3.15	2.15	2.15	2.15	1.65	1.9	.....
10	3.0	3.05	3.6	3.3	4.1	2.95	2.1	2.3	2.05	1.65	1.85	.....
11	2.7	3.35	3.4	3.35	3.8	2.8	2.0	2.05	2.0	1.9	2.1	.....
12	8.6	4.8	3.9	3.55	3.55	2.7	2.0	2.0	1.9	2.45	2.5	.....
13	5.4	5.8	3.75	3.4	3.35	2.6	1.9	1.85	1.8	2.15	.....	.....
14	4.6	6.4	3.8	3.25	3.15	2.6	1.9	1.75	1.75	1.8	.....	.....
15	4.0	7.6	3.7	3.1	3.0	3.4	2.15	1.7	1.7	1.9	.....	.....
16	3.85	6.6	3.6	3.1	3.0	3.1	2.25	1.7	1.65	1.7	.....	.....
17	3.65	4.6	3.5	3.05	2.9	2.85	2.1	1.7	1.6	1.75	.....	.....
18	3.25	4.2	3.5	3.0	2.8	2.55	2.05	1.75	1.65	1.7	.....	.....
19	3.15	3.85	3.8	3.0	3.8	2.5	2.0	1.75	1.65	1.75	.....	.....
20	3.0	3.65	4.6	2.95	4.8	2.45	1.9	1.85	1.65	1.6	.....	.....
21	3.15	3.25	4.2	2.9	5.0	2.4	1.95	1.7	1.65	1.6	.....	.....
22	3.25	3.2	4.2	2.85	4.2	3.7	1.95	1.75	1.6	1.55	.....	.....
23	3.4	3.2	4.2	2.75	3.85	6.6	1.9	1.85	1.6	1.55	.....	.....
24	3.3	3.0	4.4	2.7	3.5	4.2	1.8	1.9	1.55	1.6	.....	.....
25	3.15	3.0	4.5	2.9	3.2	3.35	1.8	1.95	1.55	1.55	.....	.....
26	2.95	3.2	4.0	5.2	2.95	3.1	1.85	2.15	1.55	2.0	.....	.....
27	3.85	3.1	3.8	4.0	3.4	2.85	1.9	2.4	1.6	1.9	.....	.....
28	3.65	2.95	3.5	3.4	3.25	2.55	1.8	2.1	1.65	1.8	.....	.....
29	3.65	2.9	3.4	3.35	3.25	2.5	1.85	2.0	1.65	2.25	.....	.....
30	3.25	.....	3.4	3.2	3.6	2.7	1.8	1.9	1.65	3.7	.....	.....
31	3.05	.....	3.4	.....	3.25	.....	1.8	1.9	.....	3.25	.....	.....

Rating table for North Fork of Holston River at Saltville, Va., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	33	2.90	290	4.30	825	6.40	2,360
1.60	46	3.00	315	4.40	880	6.60	2,520
1.70	60	3.10	340	4.50	940	6.80	2,680
1.80	75	3.20	370	4.60	1,000	7.00	2,840
1.90	90	3.30	400	4.70	1,065	7.20	3,000
2.00	106	3.40	430	4.80	1,130	7.40	3,160
2.10	123	3.50	465	4.90	1,200	7.60	3,320
2.20	141	3.60	500	5.00	1,270	7.80	3,480
2.30	160	3.70	540	5.20	1,415	8.00	3,640
2.40	180	3.80	580	5.40	1,565	9.00	4,440
2.50	200	3.90	625	5.60	1,720	10.00	5,240
2.60	221	4.00	670	5.80	1,880		
2.70	243	4.10	720	6.00	2,040		
2.80	266	4.20	770	6.20	2,200		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on nine discharge measurements made during 1907 and 1908 and is well defined below gage height 2.3 feet. Above gage height 5.5 feet the rating curve is a tangent, the difference being 80 per tenth.

Monthly discharge of North Fork of Holston River at Saltville, Va., for 1907 and 1908.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
1907.				
June 11–28	5,080	266	1,370	B.
August 14–31	190	90	132	B.
September	1,560	46	223	B.
October	200	75	109	B.
November	1,420	106	458	B.
December	1,960	150	475	B.
1908.				
January	4,120	243	605	B.
February	3,320	290	739	B.
March	2,360	430	745	B.
April	5,000	243	776	B.
May	1,800	266	567	B.
June	2,520	180	471	B.
July	221	75	121	B.
August	180	60	86.8	B.
September	602	40	97.2	B.
October	540	33	92.9	B.
November 1–12	243	82	138	B.

LITTLE TENNESSEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

Little Tennessee River, with its tributaries, drains a large area, extending from the Blue Ridge on the south to the Great Smoky Mountains on the north, including all the territory between the basins of Pigeon and Hiwassee rivers. Its larger tributaries are the Tuckasegee from the east, and the Oconalufty from the northeast, the Cheoah from the southwest, and the Nantahala from the south, while the upper portion of the Tennessee heads on top of the Blue Ridge. These waters pass through the Tennessee into Ohio River.

The upper or southern part of the basin lying on the northwest slope of the Blue Ridge, is an elevated plateau region having an altitude of more than 3,000 feet, with low, rounded granite knobs and few high summits, and broad alluvial flats, the deposit of the slow streams. The Balsam, Great Smoky, and Unaka Mountains, with

many crests over 6,000 feet high, form the watershed on the north and west, and from these descend into the northern portion of the basin many swift streams which have carved deep narrow valleys, leaving high intervening ridges with deep and rugged slopes. The watersheds between several of these streams are high and rough, especially in the Cheoah, Nantahala, and Cowee ranges. The lower part of the basin includes some of the most rugged land in the southern Appalachians with only a very small part suited for tillage and few alluvial bottoms, but in the upper part much of the mountain land is not steep and there are several large and fertile valleys.

The soils in the upper part of the basin are sandy, derived from granite. On Little Tennessee River around and above Franklin, where most of the good farms are located, they are of deep and fertile red loams, derived from schists. In the narrow valleys around the high mountains, where sandstones, quartzite, and conglomerates prevail, the soils are generally thin and sandy, and poor agriculturally, but on north slopes and in hollows are well suited to forests. The alluvial bottoms of many of the streams are also light and sandy, though those of the Little Tennessee are silts of the finest texture.

LITTLE TENNESSEE RIVER NEAR FRANKLIN, N. C.

This station is located at the iron wagon bridge about 1 mile northeast of Franklin, N. C. It was established June 12, 1907, in cooperation with the Forest Service to supply data regarding the water resources and power possibilities in the southern Appalachian Mountains. The station is 1 mile below the mouth of Cullasaja River, which is an important tributary.

Discharge measurements are made from the bridge where the river is about 125 feet wide with high banks, permanent, rocky bottom, and swift current.

The gage is attached to a tree on the left bank 700 feet above the bridge.[a]

Discharge measurements of Little Tennessee River near Franklin, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 12	F. A. Murray	126	267	1.84	687
July 17	do	125	245	1.56	550
Do	B. M. Hall, jr	125	245	1.56	547
August 28	F. P. Thomas	123	215	1.21	414
Do	do	123	217	1.20	428
Do	F. A. Murray	112	185	1.13	351
November 8	do	112	182	1.19	348
November 9	do	112	182	1.17	342
1908.					
May 22	M. R. Hall	125	278	2.18	843
Do	do	125	287	2.16	849
December 19	W. A. Lamb	120	269	1.95	660

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Little Tennessee River near Franklin, N. C., for 1907 and 1908.

[Observer, T. W. Angel.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	1.8	1.25	1.05	1.7	1.1	2.0
2	.....	.....	.....	.....	.....	.....	1.8	1.25	1.0	1.5	1.1	2.1
3	.....	.....	.....	.....	.....	.....	1.75	1.25	1.0	1.45	1.1	2.3
4	.....	.....	.....	.....	.....	.....	2.0	1.25	1.05	1.4	1.1	2.3
5	.....	.....	.....	.....	.....	.....	1.9	1.2	1.1	1.35	1.1	2.4
6	.....	.....	.....	.....	.....	.....	1.7	1.2	1.1	1.3	1.1	2.45
7	.....	.....	.....	.....	.....	.....	1.7	1.15	1.1	1.3	1.6	2.4
8	.....	.....	.....	.....	.....	.....	1.65	1.15	1.1	1.25	2.0	2.6
9	.....	.....	.....	.....	.....	.....	1.6	1.1	1.1	1.2	1.8	2.65
10	.....	.....	.....	.....	.....	.....	1.6	1.1	1.05	1.15	1.8	2.65
11	.....	.....	.....	.....	.....	.....	1.6	1.1	1.1	1.1	1.8	2.6
12	.....	.....	.....	.....	.....	1.85	1.8	1.4	1.05	1.1	1.7	2.6
13	.....	.....	.....	.....	.....	1.8	1.85	1.4	1.0	1.05	1.65	2.6
14	.....	.....	.....	.....	.....	2.0	1.75	1.35	1.0	1.0	1.65	2.5
15	.....	.....	.....	.....	.....	1.85	1.7	1.6	1.0	1.0	1.65	2.85
16	.....	.....	.....	.....	.....	1.8	1.7	1.55	1.0	1.0	1.7	3.0
17	.....	.....	.....	.....	.....	1.7	1.65	1.7	1.0	1.05	2.0	3.0
18	.....	.....	.....	.....	.....	1.65	1.6	2.0	1.0	1.0	1.9	3.2
19	.....	.....	.....	.....	.....	1.8	1.55	1.8	.95	1.0	1.9	3.3
20	.....	.....	.....	.....	.....	1.8	1.5	1.7	.9	1.0	1.9	3.4
21	.....	.....	.....	.....	.....	1.7	1.5	1.6	.9	1.0	1.85	3.4
22	.....	.....	.....	.....	.....	1.65	1.45	1.55	.9	1.0	1.8	3.3
23	.....	.....	.....	.....	.....	1.8	1.4	1.5	6.7	1.0	1.8	3.2
24	.....	.....	.....	.....	.....	2.3	1.4	1.4	2.6	1.0	1.8	3.0
25	.....	.....	.....	.....	.....	1.9	1.4	1.35	2.0	1.0	1.8	3.0
26	.....	.....	.....	.....	.....	1.8	1.35	1.25	1.6	1.0	2.0	2.95
27	.....	.....	.....	.....	.....	1.75	1.4	1.2	1.5	1.1	2.0	2.9
28	.....	.....	.....	.....	.....	1.8	1.35	1.15	2.7	1.1	2.0	2.85
29	.....	.....	.....	.....	.....	2.1	1.35	1.1	2.5	1.1	2.0	2.8
30	.....	.....	.....	.....	.....	2.0	1.3	1.05	2.0	1.1	2.0	2.75
31	.....	.....	.....	.....	.....	.....	1.3	1.05	.....	1.1	.....	2.7
1908.												
1	2.7	2.7	2.7	2.5	3.0	2.3	1.8	1.7	2.05	1.15	1.9	1.8
2	2.7	2.6	2.7	2.45	2.9	2.2	1.8	1.6	2.0	1.2	1.7	2.2
3	2.7	2.55	2.65	2.45	2.8	2.5	1.85	1.55	1.95	1.15	1.4	1.85
4	2.7	2.5	2.6	2.4	2.7	2.3	2.9	1.55	1.95	1.2	2.0	1.85
5	4.0	3.0	2.55	2.5	2.65	2.25	2.4	1.5	2.3	1.2	1.8	1.75
6	3.6	2.5	2.5	2.4	2.6	2.2	2.1	1.9	2.1	1.2	1.6	1.65
7	3.5	2.45	2.45	2.35	3.9	2.2	2.6	1.85	2.0	1.15	1.4	5.9
8	3.35	2.4	2.45	2.3	3.0	2.2	2.2	1.85	1.9	1.15	1.5	4.4
9	3.2	2.4	2.4	2.25	2.7	2.2	2.8	1.8	1.8	1.5	1.5	3.0
10	2.7	2.35	2.4	2.2	2.65	2.15	3.0	1.7	1.8	2.4	1.5	2.6
11	3.0	3.2	3.0	2.15	2.6	2.1	2.9	1.65	1.75	1.5	1.5	2.4
12	7.1	2.7	2.7	2.1	2.55	2.1	2.1	1.55	1.7	1.3	1.7	2.9
13	5.2	2.85	2.6	2.05	2.45	2.0	2.0	1.5	1.6	1.2	1.6	2.6
14	4.6	2.75	2.55	2.0	2.35	2.0	2.0	1.5	1.55	1.2	1.8	2.3
15	3.3	9.7	2.5	4.1	2.3	1.95	1.95	1.45	1.5	1.15	1.6	2.1
16	3.2	6.1	2.45	3.5	2.3	2.8	2.1	1.45	1.45	1.2	1.4	2.0
17	2.7	5.2	2.4	2.95	2.3	2.4	2.0	1.45	1.45	1.2	1.5	1.9
18	2.5	4.0	2.35	2.6	2.25	2.25	1.9	1.55	1.35	1.2	1.6	1.9
19	2.5	4.1	2.3	2.55	2.2	2.1	1.85	1.5	1.3	1.2	1.5	1.95
20	2.5	3.7	2.5	2.5	2.9	2.0	1.8	1.5	1.3	1.2	1.5	1.9
21	2.45	3.2	3.35	2.45	2.4	1.85	1.85	1.45	1.3	1.2	1.6	1.85
22	2.4	2.9	2.9	2.4	2.25	2.1	1.85	2.7	1.25	1.2	1.4	3.2
23	2.35	2.85	3.4	2.35	2.2	2.0	1.75	2.5	1.25	2.7	1.6	3.1
24	2.3	2.8	6.0	2.2	2.3	2.0	1.7	2.8	1.2	2.6	1.6	3.0
25	2.3	3.0	4.9	7.0	2.5	1.95	1.65	2.6	1.2	1.7	1.6	2.9
26	2.3	3.1	3.0	4.7	2.2	1.9	1.55	2.5	1.2	1.3	1.6	2.4
27	2.3	3.0	2.7	4.2	2.55	1.9	1.55	2.45	1.15	1.2	1.55	2.2
28	2.3	3.0	2.6	3.7	2.3	1.85	2.0	2.3	1.3	1.5	1.5	2.2
29	2.25	2.7	2.6	3.35	2.3	1.85	1.9	2.2	1.25	2.7	1.5	2.1
30	2.2	.....	2.55	3.1	2.2	1.85	1.85	2.1	1.25	2.2	1.4	2.1
31	3.0	.....	2.5	.....	.....	.....	1.75	2.1	.....	1.7	.....	2.5

Daily discharge, in second-feet, of Little Tennessee River near Franklin, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	645	398	328	595	345	750
2	.....	.....	.....	.....	.....	.....	645	398	310	500	345	805
3	.....	.....	.....	.....	.....	.....	620	398	310	478	345	920
4	.....	.....	.....	.....	.....	.....	750	398	328	455	345	920
5	.....	.....	.....	.....	.....	.....	695	380	345	435	345	980
6	.....	.....	.....	.....	.....	.....	595	380	345	415	345	1,010
7	.....	.....	.....	.....	.....	.....	595	362	345	415	545	980
8	.....	.....	.....	.....	.....	.....	570	362	345	398	750	1,100
9	.....	.....	.....	.....	.....	.....	545	345	345	380	645	1,130
10	.....	.....	.....	.....	.....	.....	545	345	328	362	645	1,130
11	.....	.....	.....	.....	.....	.....	545	345	345	345	645	1,100
12	.....	.....	.....	.....	.....	670	645	455	328	345	595	1,100
13	.....	.....	.....	.....	.....	645	670	455	310	328	570	1,100
14	.....	.....	.....	.....	.....	750	620	435	310	310	570	1,040
15	.....	.....	.....	.....	.....	670	595	545	310	310	570	.....
16	.....	.....	.....	.....	.....	645	595	522	310	310	595	.....
17	.....	.....	.....	.....	.....	595	570	595	310	328	750	.....
18	.....	.....	.....	.....	.....	570	545	750	310	310	695	.....
19	.....	.....	.....	.....	.....	645	522	645	292	310	695	.....
20	.....	.....	.....	.....	.....	645	500	595	275	310	695	.....
21	.....	.....	.....	.....	.....	595	500	545	275	310	670	.....
22	.....	.....	.....	.....	.....	570	478	522	275	310	645	.....
23	.....	.....	.....	.....	.....	645	455	500	.....	310	645	.....
24	.....	.....	.....	.....	.....	920	455	455	1,100	310	645	.....
25	.....	.....	.....	.....	.....	695	455	435	750	310	645	.....
26	.....	.....	.....	.....	.....	645	435	398	545	310	750	.....
27	.....	.....	.....	.....	.....	620	455	380	500	345	750	.....
28	.....	.....	.....	.....	.....	645	435	362	.....	345	750	.....
29	.....	.....	.....	.....	.....	805	435	345	1,040	345	750	.....
30	.....	.....	.....	.....	.....	750	415	328	750	345	750	.....
31	.....	.....	.....	.....	.....	.....	415	328	.....	345	.....	.....
1908.												
1	.....	.....	.....	1,040	.....	920	645	595	778	362	695	645
2	.....	1,100	.....	1,010	.....	860	645	545	750	380	595	860
3	.....	1,070	1,130	1,010	.....	1,040	670	522	722	362	455	670
4	.....	1,040	1,100	980	.....	920	.....	522	722	380	750	670
5	.....	.....	1,070	1,040	1,130	890	980	500	920	380	645	620
6	.....	1,040	1,040	980	1,100	860	805	695	805	380	545	570
7	.....	1,010	1,010	950	.....	860	1,100	670	750	362	455	.....
8	.....	980	1,010	920	.....	860	860	670	695	362	500	.....
9	.....	980	980	890	.....	860	.....	645	645	500	500	.....
10	.....	950	980	860	1,130	832	.....	595	645	980	500	1,100
11	.....	.....	.....	832	1,100	805	.....	570	620	500	500	980
12	.....	.....	.....	805	1,070	805	805	522	595	415	595	.....
13	.....	.....	1,100	778	1,010	750	750	500	545	380	545	1,100
14	.....	.....	1,070	750	950	750	750	500	522	380	645	920
15	.....	.....	1,040	.....	920	722	722	478	500	362	545	805
16	.....	.....	1,010	.....	920	.....	805	478	478	380	455	750
17	.....	.....	980	.....	920	980	750	478	478	380	500	695
18	1,040	.....	950	1,100	890	890	695	522	435	380	545	695
19	1,040	.....	920	1,070	860	805	670	500	415	380	500	722
20	1,040	.....	1,040	1,040	.....	750	645	500	415	380	500	695
21	1,010	.....	.....	1,010	980	670	670	478	415	380	545	670
22	980	.....	.....	980	890	805	670	.....	398	380	455	.....
23	950	.....	.....	950	860	750	620	1,040	398	.....	545	.....
24	920	.....	.....	860	920	750	595	.....	380	1,100	545	.....
25	920	.....	.....	.....	1,040	722	570	1,100	380	595	545	.....
26	920	.....	.....	.....	860	695	522	1,040	380	415	545	980
27	920	.....	.....	.....	1,070	695	522	1,010	362	380	522	860
28	920	.....	1,100	.....	920	670	750	920	415	500	500	860
29	890	.....	1,100	.....	920	670	695	860	398	.....	500	805
30	860	.....	1,070	.....	860	670	670	805	398	860	455	805
31	.....	.....	1,040	.....	890	.....	620	805	.....	595	.....	1,040

NOTE.—Daily discharges for 1907 and 1908 based on a well-defined rating curve. On missing days beginning June 12, 1907, the discharge was greater than 1,150 second-feet.

LITTLE TENNESSEE RIVER AT JUDSON, N. C.

This station is located at the Southern Railway bridge, about one-fourth mile from Judson, N. C., and a short distance below the mouth of Sawyer Branch. It was established in June, 1896, for the purpose of supplying general run-off and water power data. The station is 2½ miles below the mouth of Nantahala River and about 4 miles above the mouth of Tuckaseegee River.

During 1903 the original wire gage was replaced by a standard chain gage having the same location and datum, which was used until June 30, 1905. Since July 1, 1905, a vertical gage, bolted to a solid rock on the right bank, about 100 feet above the bridge, has been used. This gage was set to read with the chain gage at a gage height of 3 feet, but owing to the large amount of slope in the river the actual elevation of its zero is 0.50 foot above the datum of the chain gage.

The river bed is rocky and uneven and the current is swift and rough, making measurements difficult at any but low stages.[a]

Discharge measurements of Little Tennessee River at Judson, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 22	M. R. Hall and F. A. Murray	150	356	3.48	1,510
Oct. 18	O. P. Hall	139	297	2.64	818

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for 1907 and 1908.

[Observer, E. G. Enloe.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.3	4.2	4.5	3.55	3.8	4.9	3.4	3.0	2.5	3.3	3.0	3.4
2	4.9	4.9	6.0	3.5	3.75	4.7	3.3	2.9	2.5	3.2	3.0	3.3
3	4.7	4.3	5.0	3.4	3.7	4.2	3.3	2.8	2.7	3.1	3.0	3.2
4	4.5	4.2	4.5	3.3	4.2	3.9	3.4	2.8	2.8	3.0	3.0	3.1
5	4.4	5.0	4.3	3.2	3.7	3.7	3.45	2.9	3.0	3.3	2.9	3.1
6	4.4	4.9	4.2	4.0	4.4	3.6	3.3	2.8	2.7	3.0	2.85	3.1
7	4.4	4.6	4.1	3.7	3.2	3.5	3.3	2.8	2.6	2.9	2.8	3.05
8	4.4	4.3	4.4	3.8	4.0	3.9	3.2	2.7	2.8	3.0	2.8	3.05
9	4.4	4.2	4.1	3.8	3.9	4.85	3.2	2.8	2.7	3.0	2.8	4.8
10	4.4	4.1	4.7	3.7	5.0	3.9	3.25	2.8	2.6	2.9	3.4	4.3
11	4.4	3.95	4.7	3.5	4.4	3.85	3.3	2.8	2.5	2.8	3.3	4.0
12	4.0	3.9	4.5	3.5	4.1	3.6	3.3	2.8	2.8	2.8	3.25	3.8
13	4.0	3.8	4.4	3.4	4.1	3.6	3.9	3.0	2.7	2.75	3.2	3.6
14	3.9	3.7	4.0	3.4	3.9	3.7	3.4	3.1	2.6	2.7	3.1	5.5
15	3.9	3.7	3.95	3.5	4.1	3.6	3.3	3.5	2.5	2.7	3.0	4.5
16	3.8	3.6	3.9	3.6	4.0	3.6	3.3	3.4	2.5	2.7	3.0	4.3
17	3.8	3.55	3.85	3.6	3.9	3.6	3.3	3.0	2.5	2.65	2.9	4.0
18	3.8	3.5	3.8	3.9	3.8	3.6	3.3	3.0	2.5	2.65	3.25	3.6
19	3.7	3.5	3.7	3.8	3.7	3.5	3.2	3.0	2.45	2.65	3.5	3.6
20	4.0	3.5	3.75	3.6	3.7	3.5	3.2	3.0	2.45	2.6	3.2	3.6

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Little Tennessee River at Judson, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	4.0	3.5	3.7	3.5	3.6	3.65	3.2	3.0	2.4	2.6	3.8	3.55
22	3.9	3.5	3.6	3.5	3.5	3.65	3.1	2.9	2.7	2.6	4.0	3.5
23	3.7	3.5	3.5	5.0	3.45	3.6	2.9	3.05	7.0	2.6	4.4	6.3
24	3.7	3.5	3.5	5.5	3.45	3.6	2.9	3.0	4.0	2.6	5.8	5.1
25	3.7	3.7	3.5	5.1	3.5	4.5	3.0	2.9	3.5	2.55	4.6	4.5
26	3.8	3.8	3.6	4.9	4.0	3.9	3.0	2.7	3.3	2.5	4.2	4.3
27	3.5	3.8	3.55	4.0	4.0	3.6	3.1	2.6	3.0	2.8	3.9	4.2
28	3.0	3.8	3.5	3.95	3.6	3.7	3.0	2.6	3.1	2.75	3.7	4.1
29	3.0	.....	3.4	3.9	3.5	3.9	2.9	2.5	4.4	2.7	3.6	3.9
30	3.2	.....	3.4	3.9	3.45	3.5	3.1	2.5	3.7	2.65	3.5	6.5
31	3.5	.....	3.6	.....	3.9	.....	3.1	2.5	.....	2.6	.....	5.5
1908.												
1	4.8	4.1	4.5	4.3	4.8	3.5	2.9	2.9	3.05	2.6	3.1	3.8
2	4.5	4.4	4.4	4.2	4.7	3.5	2.9	2.9	3.0	2.5	3.0	3.3
3	4.3	4.3	4.5	4.1	4.5	3.5	3.0	2.9	2.95	2.5	2.9	3.1
4	4.2	4.25	4.4	4.0	4.1	3.4	4.0	2.9	2.9	2.5	3.0	3.0
5	6.0	4.2	4.4	4.1	4.1	3.45	4.0	3.0	3.0	2.5	2.95	3.0
6	5.0	4.5	4.3	4.2	4.0	3.4	4.1	4.0	4.0	2.45	2.9	3.0
7	4.7	4.2	4.2	4.1	4.1	3.45	4.1	3.5	3.3	2.45	2.85	5.0
8	4.4	4.1	4.1	4.0	4.2	3.4	4.7	3.4	3.1	2.4	2.8	8.4
9	4.3	4.0	4.0	3.95	4.2	3.3	4.0	3.4	3.0	2.4	2.8	7.6
10	4.2	4.2	4.0	3.9	4.2	3.3	4.2	3.3	2.95	3.2	2.8	5.6
11	4.1	4.5	4.0	3.8	4.1	3.6	3.6	3.0	2.9	3.0	3.8	4.4
12	8.5	4.9	5.0	3.7	4.0	3.4	3.5	3.0	2.85	2.8	3.2	4.1
13	6.5	5.2	4.5	3.6	3.9	3.4	3.5	2.9	2.8	2.7	3.1	3.9
14	5.1	5.3	4.45	3.55	3.9	4.0	3.5	2.85	2.8	2.6	3.5	3.8
15	5.0	10.9	4.4	4.7	3.9	4.7	3.4	2.8	2.8	2.55	3.4	3.7
16	4.7	7.9	4.4	5.0	3.9	3.6	3.4	2.85	2.7	2.5	3.2	4.4
17	4.8	6.5	4.3	4.5	3.9	3.4	3.3	2.8	2.7	2.5	3.0	4.2
18	4.55	5.5	4.0	4.2	3.9	3.35	3.2	2.8	2.7	2.5	2.95	4.0
19	4.4	5.3	3.9	4.3	4.4	3.3	3.5	2.85	2.7	2.5	2.9	3.8
20	4.3	5.1	5.1	4.2	3.1	3.3	3.1	2.8	2.7	2.5	2.85	3.5
21	4.2	4.9	5.1	4.0	3.2	3.4	3.0	2.95	2.7	2.5	2.8	3.4
22	4.15	4.7	4.6	3.9	3.2	3.3	3.0	4.0	2.65	2.45	2.8	5.1
23	4.1	4.4	6.0	3.9	3.1	3.1	3.0	4.0	2.65	4.0	2.8	5.0
24	4.0	4.4	7.5	3.7	3.6	3.1	3.0	4.05	2.6	5.0	2.8	4.3
25	3.9	4.5	6.2	7.0	4.0	3.1	3.0	5.4	2.6	5.2	2.8	4.1
26	3.9	4.4	5.5	7.0	4.1	3.0	3.0	4.45	2.5	3.0	2.8	4.0
27	3.9	4.4	5.2	6.5	4.0	3.0	3.5	3.8	2.5	2.9	2.8	3.8
28	4.0	4.2	5.0	5.0	4.2	3.0	3.4	3.5	2.5	3.0	2.8	3.8
29	4.0	4.2	4.7	4.7	4.0	2.9	3.0	3.3	2.7	4.0	2.8	3.9
30	3.95	.....	4.5	4.7	4.0	2.9	3.0	3.2	2.6	3.6	2.7	4.0
31	3.9	.....	4.4	.....	3.6	.....	2.9	3.1	.....	3.2	.....	4.1

Rating table for Little Tennessee River at Judson, N. C., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.40	600	3.80	1,970	5.20	4,480	7.20	9,670
2.50	670	3.90	2,110	5.30	4,700	7.40	10,290
2.60	740	4.00	2,260	5.40	4,920	7.60	10,930
2.70	810	4.10	2,420	5.50	5,150	7.80	11,600
2.80	890	4.20	2,580	5.60	5,380	8.00	12,300
2.90	970	4.30	2,750	5.70	5,620	8.20	13,030
3.00	1,060	4.40	2,920	5.80	5,860	8.40	13,800
3.10	1,150	4.50	3,100	5.90	6,110	8.60	14,600
3.20	1,250	4.60	3,280	6.00	6,360	8.80	15,400
3.30	1,350	4.70	3,470	6.20	6,870	9.00	16,200
3.40	1,460	4.80	3,660	6.40	7,390	10.00	20,700
3.50	1,580	4.90	3,860	6.60	7,930	11.00	25,500
3.60	1,700	5.00	4,060	6.80	8,490		
3.70	1,830	5.10	4,270	7.00	9,070		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon 10 discharge measurements made during 1905 to 1907 and form of previous curves and is well defined between gage heights 2.6 feet and 11.0 feet.

Monthly discharge of Little Tennessee River at Judson, N. C., for 1907 and 1908.

[Drainage area, 675 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	4,700	1,060	2,340	3.47	4.00	B.
February	4,060	1,580	2,240	3.32	3.46	B.
March	6,360	1,460	2,410	3.57	4.12	B.
April	5,150	1,250	2,100	3.11	3.47	B.
May	4,060	1,250	2,080	3.08	3.55	B.
June	3,860	1,580	2,060	3.05	3.40	B.
July	2,110	970	1,280	1.90	2.19	B.
August	1,580	670	964	1.43	1.65	B.
September	9,070	600	1,260	1.87	2.09	B.
October	1,350	670	897	1.33	1.53	B.
November	5,860	890	1,620	2.40	2.68	B.
December	7,660	1,100	2,610	3.87	4.46	B.
The year	9,070	600	1,820	2.70	36.60	
1908.						
January	14,200	2,110	3,480	5.16	5.95	A.
February	25,000	2,260	4,430	6.56	7.08	A.
March	10,600	2,110	3,600	5.33	6.14	A.
April	9,070	1,640	3,160	4.68	5.22	A.
May	3,660	1,150	2,260	3.35	3.86	B.
June	3,470	970	1,460	2.16	2.41	B.
July	3,470	970	1,540	2.28	2.63	B.
August	4,920	890	1,470	2.18	2.51	B.
September	2,260	670	936	1.39	1.55	B.
October	4,480	600	1,130	1.67	1.92	B.
November	1,970	810	1,040	1.54	1.72	B.
December	13,800	1,060	2,980	4.41	5.08	A.
The year	25,000	600	2,290	3.39	46.07	

LITTLE TENNESSEE RIVER AT McGHEE, TENN.

This station is located at the Louisville and Nashville Railroad bridge about one-third mile south of McGhee Station, Tenn., and one-half mile below the mouth of Tellico River. It was established by the United States Weather Bureau late in 1904, the gage readings beginning November 29 of that year. Since that time discharge measurements have been made by the United States Geological Survey and the daily gage readings have been furnished by the Weather Bureau.

Although the river is navigable up to the station, there are very great water power possibilities a short distance above.

The section is about 530 feet wide at ordinary stages. The current is very swift even at low water and is somewhat broken at places, but is fairly good for measuring purposes.

The gage is a boxed chain gage located on the railroad bridge. Owing to a new location of the railroad, a new crossing of the river was made 1,000 feet above the old one. The gage was moved to the new bridge December 1, 1905, and was set to read the same as before by raising its datum the exact amount of the slope of river between the points (0.30 foot at gage height 4 feet).[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Little Tennessee River at McGhee, Tenn., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 27	M. R. Hall	485	2,020	5.05	8,500
August 15	F. A. Murray	462	1,200	3.29	3,660
1908.					
December 18	M. R. Hall	372	1,310	3.60	4,530

Daily gage height, in feet, of Little Tennessee River at McGhee, Tenn., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	7.5	4.4	4.6	4.6	4.3	4.8	4.4	3.0	2.6	3.8	2.6	3.7
2	6.3	9.1	5.5	4.2	4.2	5.6	4.1	3.1	2.6	3.5	2.7	3.6
3	5.7	6.2	6.9	3.9	4.1	4.7	3.4	3.0	2.6	3.3	4.4	3.5
4	5.5	5.3	5.6	3.8	5.1	4.6	4.1	2.9	2.8	3.2	3.5	3.5
5	5.3	6.0	5.0	3.7	5.0	4.4	3.9	2.9	2.8	3.5	3.1	3.4
6	5.0	6.2	4.8	3.9	4.5	4.2	3.7	3.3	2.8	3.9	3.0	3.2
7	4.8	5.5	4.5	4.2	5.8	4.0	3.6	3.3	2.6	3.4	3.0	3.3
8	4.7	5.1	5.4	4.3	6.1	4.0	3.5	3.0	2.7	3.3	2.9	3.3
9	4.6	4.9	5.3	4.2	5.6	6.1	3.4	3.0	3.4	3.4	2.8	3.2
10	4.6	4.6	5.2	4.2	5.1	5.3	3.3	2.9	3.0	3.2	3.9	3.7
11	4.5	4.5	6.6	4.0	5.1	4.8	3.4	2.9	3.0	3.1	5.0	5.4
12	4.4	4.4	5.5	3.9	5.9	4.5	3.4	2.9	3.5	3.0	4.0	4.2
13	4.3	4.3	4.4	3.9	5.2	4.2	5.5	3.2	2.9	2.9	3.6	4.0
14	4.3	4.2	4.7	3.8	4.9	4.5	4.5	3.0	2.7	2.9	3.4	4.3
15	4.1	4.1	5.6	3.7	4.7	4.5	4.0	3.1	2.6	2.8	3.3	5.8
16	4.1	4.0	5.4	3.9	4.9	4.0	3.7	3.3	2.5	2.8	3.2	4.9
17	4.1	4.0	4.9	4.3	4.5	3.6	3.6	3.5	2.5	2.8	3.1	4.5
18	4.3	3.9	4.7	4.1	4.3	3.6	3.5	3.3	2.6	2.8	3.2	4.2
19	4.1	3.9	4.5	5.1	4.2	3.6	3.5	3.3	2.6	2.7	3.9	4.1
20	4.1	3.9	4.4	5.7	4.1	3.9	3.6	3.2	2.5	2.7	3.7	4.0
21	4.7	3.8	4.3	4.7	4.0	3.9	3.5	3.0	2.4	2.7	3.5	3.8
22	4.2	3.8	4.2	4.4	3.9	3.7	3.3	3.2	3.0	2.7	4.8	3.8
23	4.1	3.8	4.1	5.2	3.8	3.9	3.2	3.2	6.3	2.7	4.9	4.0
24	4.0	3.7	4.0	6.0	3.8	4.3	3.2	3.2	6.6	2.7	9.8	6.5
25	4.0	4.4	4.0	5.2	3.8	5.3	3.1	3.1	4.3	2.7	6.7	5.2
26	4.0	4.1	3.9	4.8	4.0	4.5	3.3	3.0	3.5	2.6	5.3	4.6
27	4.0	5.0	4.1	5.2	4.5	4.4	3.3	2.9	3.2	2.7	4.7	4.5
28	3.9	4.8	3.9	5.0	4.1	4.0	3.1	2.8	3.2	3.2	4.3	4.3
29	3.8	.....	3.8	4.6	3.8	7.7	3.0	3.0	5.2	3.1	4.1	4.2
30	3.7	.....	3.7	4.4	3.7	5.0	3.7	2.8	4.5	2.8	3.9	5.3
31	3.8	.....	3.7	.....	3.8	.....	3.6	2.7	.....	2.7	.....	8.8
1908.												
1	6.2	5.0	5.2	4.9	5.0	4.0	3.0	2.8	3.2	2.5	3.0	2.6
2	5.4	5.3	5.3	4.7	4.5	3.8	3.0	2.7	3.1	2.4	2.9	4.1
3	5.0	4.2	5.8	4.6	4.5	3.7	3.0	2.7	3.0	2.4	2.8	3.6
4	4.4	4.3	5.6	4.4	4.4	3.8	3.6	2.7	3.0	2.4	2.8	3.1
5	9.5	4.4	5.2	4.3	4.3	4.1	4.7	3.1	2.9	2.4	2.8	3.1
6	7.0	4.5	5.2	4.7	4.5	4.0	4.5	3.8	4.2	2.3	2.7	3.0
7	5.9	4.7	5.1	4.5	4.6	3.9	4.3	4.8	3.9	2.3	2.7	8.0
8	5.6	4.3	5.0	4.3	5.7	3.7	6.2	3.8	3.3	2.2	2.6	9.2
9	5.1	4.2	4.8	4.2	4.8	3.6	4.5	4.6	3.1	2.3	2.6	5.6
10	4.8	4.3	4.7	4.2	4.6	3.5	4.4	4.3	3.0	3.3	2.6	4.7
11	4.6	4.5	4.5	4.1	4.5	3.7	4.1	3.6	2.9	3.6	2.7	4.2
12	10.8	4.7	6.5	4.0	4.3	3.8	4.0	3.2	2.9	2.8	3.3	4.7
13	8.9	5.2	6.5	3.9	4.2	3.5	3.7	3.1	2.8	2.6	3.1	4.9
14	6.9	6.6	5.6	3.9	4.1	3.5	3.5	3.0	2.8	2.5	2.9	4.4
15	5.6	10.0	5.2	3.9	4.0	4.4	3.7	2.9	2.8	2.4	3.0	4.1
16	5.6	11.0	5.0	5.8	4.0	4.3	3.5	2.9	2.7	2.4	3.1	3.9
17	6.1	7.9	4.7	5.0	3.8	3.7	3.5	2.9	2.7	2.4	2.9	3.8
18	5.5	6.6	4.6	4.6	4.2	3.5	3.3	3.0	2.7	2.3	2.8	3.7
19	5.1	6.1	4.5	4.8	4.7	3.4	3.7	3.0	2.6	2.3	2.8	3.6
20	4.9	5.8	4.6	4.6	5.5	3.3	3.7	3.7	2.5	2.3	2.8	3.5
21	4.7	5.3	7.9	4.4	4.6	3.4	3.2	3.3	2.6	2.3	2.7	3.3
22	4.7	5.2	6.1	4.2	4.3	3.4	3.1	5.2	2.6	2.3	2.7	4.8
23	4.7	5.0	5.5	4.1	4.1	3.4	3.0	6.6	2.5	2.4	2.7	8.5
24	4.5	4.9	10.6	4.1	4.4	3.3	3.1	4.3	2.5	4.0	2.7	5.7
25	4.3	4.7	8.6	4.7	4.1	3.4	3.1	4.5	2.5	3.5	2.7	4.9
26	4.2	4.9	6.9	8.3	4.3	3.7	3.0	5.1	2.5	3.0	2.7	4.7
27	4.4	4.5	6.1	6.1	4.2	3.2	3.0	4.3	2.4	2.7	2.7	4.4
28	4.4	4.7	5.7	5.5	4.2	3.1	3.0	3.8	2.4	2.6	2.6	4.1
29	4.2	4.3	5.4	5.0	4.1	3.1	2.9	3.6	2.6	3.2	2.6	4.5
30	4.1	.....	5.2	4.8	4.5	3.0	3.2	3.4	2.7	4.0	2.6	4.5
31	4.0	.....	5.0	.....	4.1	.....	3.0	3.3	.....	3.5	.....	4.8

Rating table for Little Tennessee River at McGhee, Tenn., for 1906 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.20	1,650	3.60	4,380	5.00	8,220	6.80	13,700
2.30	1,790	3.70	4,630	5.10	8,520	7.00	14,320
2.40	1,940	3.80	4,890	5.20	8,820	7.20	14,960
2.50	2,090	3.90	5,150	5.30	9,120	7.40	15,600
2.60	2,250	4.00	5,410	5.40	9,420	7.60	16,240
2.70	2,420	4.10	5,680	5.50	9,720	7.80	16,880
2.80	2,600	4.20	5,950	5.60	10,020	8.00	17,520
2.90	2,790	4.30	6,220	5.70	10,320	8.20	18,180
3.00	2,990	4.40	6,500	5.80	10,620	8.40	18,840
3.10	3,200	4.50	6,780	5.90	10,920	8.60	19,500
3.20	3,420	4.60	7,060	6.00	11,220	8.80	20,160
3.30	3,650	4.70	7,350	6.20	11,840	9.00	20,820
3.40	3,890	4.80	7,640	6.40	12,460	10.00	24,220
3.50	4,130	4.90	7,930	6.60	13,080	11.00	27,720

NOTE.—The above table is applicable only for open-channel conditions. It is based upon 13 discharge measurements made during 1903 to 1908 and one in 1901, and is well defined between gage heights 2.2 feet and 5.0 feet.

Monthly discharge of Little Tennessee River at McGhee, Tenn., for 1907 and 1908.

[Drainage area, 2,470 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	15,900	4,630	6,940	2.81	3.24	A.
February	21,200	4,630	7,490	3.03	3.16	A.
March	14,000	4,630	7,560	3.06	3.53	A.
April	11,200	4,630	6,630	2.69	3.00	A.
May	11,500	4,630	6,950	2.81	3.24	A.
June	16,600	4,380	6,910	2.80	3.12	A.
July	9,720	2,990	4,490	1.82	2.10	A.
August	4,130	2,420	3,140	1.27	1.46	A.
September	13,100	1,940	3,820	1.55	1.73	A.
October	5,150	2,250	3,090	1.25	1.44	A.
November	23,500	2,250	5,680	2.30	2.57	A.
December	20,200	3,420	6,500	2.63	3.03	A.
The year	23,500	1,940	5,770	2.34	31.62	
1908.						
January	27,000	5,410	9,910	4.01	4.62	A.
February	27,700	5,950	9,610	3.89	4.20	A.
March	26,300	6,780	10,400	4.21	4.85	A.
April	18,500	5,150	7,370	2.98	3.32	A.
May	10,300	4,890	6,580	2.66	3.07	A.
June	6,500	2,990	4,420	1.79	2.00	A.
July	11,800	2,790	4,470	1.81	2.09	A.
August	13,100	2,420	4,740	1.92	2.21	A.
September	5,950	1,940	2,760	1.12	1.25	A.
October	5,410	1,650	2,540	1.03	1.19	A.
November	3,650	2,250	2,590	1.05	1.17	A.
December	21,500	2,250	7,230	2.93	3.38	A.
The year	27,700	1,650	6,050	2.45	33.35	

CULLASAJA RIVER AT CULLASAJA, N. C.

This station is located at a wagon bridge at Cullasaja, N. C., 5 miles southeast of Franklin, N. C., and about 1 mile below the mouth of Ellijay Creek. It was established June 13, 1907, in cooperation with the Forest Service to supply data relative to the water resources in the Southern Appalachian Mountains.

Discharge measurements are made from the wagon bridge where the section is excellent for making measurements.[a]

Discharge measurements of Cullasaja River at Cullasaja, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 13	F. A. Murray	37	90	1.60	187
July 18	do	36	79	1.32	131
Do	B. M. Hall, jr	36	80	1.32	126
August 29	F. A. Murray	33	67	.95	78
Do	do	33	71	.95	84
November 9	do	34	64	.92	80
Do	do	34	64	.94	82
1908.					
May 23	M. R. Hall	39	96	1.78	208
Do	do	39	97	1.78	209
Do	do	39	97	1.78	190
December 21	W. A. Lamb	38	91	1.59	172

Daily gage height, in feet, of Cullasaja River at Cullasaja, N. C., for 1907 and 1908.

[Observer, J. M. Moore.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							1.65	1.05	0.9	1.25	0.9	1.5
2							1.55	1.05	1.1	1.15	2.1	1.45
3							1.55	1.0	1.45	1.1	1.8	1.45
4							1.7	1.0	1.0	1.05	1.05	1.35
5							1.65	1.0	1.0	1.3	1.0	1.35
6							1.45	1.2	.95	1.0	1.0	1.35
7							1.4	1.0	1.0	1.0	1.0	1.35
8							1.4	1.0	.95	1.2	1.0	1.3
9							1.3	.95	.9	1.0	.95	2.3
10							1.3	.95	.9	1.0	1.05	3.0
11							1.35	1.1	1.2	.95	1.3	1.8
12							1.7	1.25	.85	.95	1.25	2.0
13						1.6	1.6	1.1	.85	.9	1.1	1.95
14						1.8	1.4	1.25	.9	.9	1.1	3.65
15						1.65	1.65	1.2	.9	.9	1.05	2.85
16						1.65	1.35	1.0	.9	.9	1.05	2.0
17						1.45	1.3	1.05	.85	.9	1.0	2.25
18						1.45	1.3	1.5	.85	.9	2.3	2.2
19						1.5	1.3	1.25	.85	.9	1.5	2.0
20						1.6	1.25	1.55	.8	.9	1.45	1.9
21						1.5	1.15	1.5	.8	.85	2.95	1.8
22						1.45	1.15	1.05	.95	.85	2.25	1.8
23						2.9	1.1	1.0	3.0	.85	2.85	4.0
24						1.75	1.3	1.1	1.65	.8	3.8	3.0
25						2.05	1.1	1.0	1.6	.8	2.4	2.65
26						1.8	1.1	.95	1.0	.8	2.1	2.5
27						1.75	1.1	.9	1.0	1.1	1.8	2.35
28						2.2	1.1	1.0	2.35	1.05	1.75	2.35
29						1.75	1.15	.95	1.8	1.0	1.65	2.15
30						1.4	1.4	.95	1.45	.95	1.6	3.9
31							1.2	.95		.9		2.8
1908.												
1	2.65	2.5	2.35	2.1	2.5	1.8	1.4	1.15	1.0	1.0	1.5	2.35
2	2.4	2.3	2.45	2.5	2.4	1.65	1.4	1.0	1.0	.9	1.3	1.8
3	2.15	2.15	2.3	2.0	2.35	1.6	1.5	1.05	1.1	.9	1.45	1.7
4	2.7	2.0	2.2	2.0	2.35	1.65	2.0	1.0	1.1	.9	1.4	1.5
5	2.8	1.95	2.2	2.05	2.2	1.8	1.7	1.15	2.4	.85	1.4	1.5
6	2.45	2.1	2.2	2.0	2.1	1.75	1.85	1.7	1.85	.85	1.35	1.5
7	2.35	1.95	2.2	1.9	3.0	1.55	1.8	1.3	1.45	.85	1.35	4.6
8	2.2	1.9	2.0	1.9	2.4	1.5	1.75	1.4	1.4	.85	1.25	2.8
9	2.1	1.9	2.05	1.85	2.3	1.5	2.5	1.5	1.3	1.85	1.25	2.5
10	2.0	2.05	2.05	1.85	2.25	1.5	1.95	1.3	1.2	1.9	1.2	2.4

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Cullasaja River at Cullasaja, N. C., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
11	4.1	2.3	2.25	1.8	2.2	1.5	1.85	1.25	1.0	1.1	1.7	2.0
12	4.5	2.9	2.35	1.75	2.1	1.65	1.85	1.15	1.0	1.0	1.4	2.2
13	3.4	3.1	2.05	1.7	2.0	1.5	1.85	1.1	1.0	1.0	1.2	2.0
14	3.05	3.2	2.1	1.7	2.0	.....	1.7	1.05	1.0	1.0	1.75	1.8
15	2.85	6.0	2.0	2.5	2.0	2.25	1.6	1.0	1.1	1.0	1.6	1.75
16	2.8	4.5	2.0	2.35	2.0	1.8	1.5	1.05	1.1	.95	1.4	1.75
17	2.6	4.3	1.95	2.35	2.0	1.75	1.5	1.2	1.1	.9	1.35	1.75
18	2.45	3.1	1.9	2.3	2.0	1.65	1.5	1.15	1.05	.9	1.3	1.75
19	2.35	3.0	1.85	2.2	2.05	1.55	1.5	1.15	1.0	.9	1.3	1.7
20	2.25	2.8	2.6	2.05	2.0	1.55	1.45	1.1	1.0	.9	1.35	1.7
21	2.25	2.7	2.45	2.05	1.95	1.65	1.35	1.1	1.0	.9	1.35	1.7
22	2.2	2.6	2.15	1.95	1.85	1.55	1.3	2.1	1.0	1.15	1.25	3.4
23	2.15	2.5	4.5	1.9	1.8	1.5	1.3	2.0	1.0	3.2	1.25	2.4
24	2.0	2.45	3.5	4.7	1.9	2.15	1.3	3.5	1.0	1.85	1.2	2.3
25	2.0	2.35	3.0	3.4	1.85	1.5	1.3	3.0	.95	1.4	1.2	2.2
26	2.0	2.45	2.8	3.4	2.3	1.45	1.35	2.2	1.0	1.4	1.15	2.0
27	2.0	2.4	2.6	3.0	2.0	1.4	1.2	1.8	1.0	1.2	1.15	1.9
28	1.95	2.35	2.5	2.7	1.9	1.4	1.4	1.75	1.3	2.5	1.15	1.9
29	1.9	2.2	2.4	2.6	1.9	1.4	1.3	1.7	1.0	2.4	1.1	1.9
30	1.9	.....	2.4	2.6	1.85	1.4	1.3	1.5	1.0	2.4	1.1	1.9
31	1.9	.....	2.3	.....	1.8	.....	1.2	1.4	.....	2.4	.....	2.0

Daily discharge, in second-feet, of Cullasaja River at Cullasaja, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	184	94	76	122	76	159
2	.....	.....	.....	.....	.....	.....	167	94	101	108	.....	152
3	.....	.....	.....	.....	.....	.....	167	88	152	101	210	152
4	.....	.....	.....	.....	.....	.....	192	88	88	94	94	136
5	.....	.....	.....	.....	.....	.....	184	88	88	129	88	136
6	.....	.....	.....	.....	.....	.....	152	115	82	88	88	136
7	.....	.....	.....	.....	.....	.....	144	88	88	88	88	136
8	.....	.....	.....	.....	.....	.....	144	88	82	115	88	129
9	.....	.....	.....	.....	.....	.....	129	82	76	88	82	.....
10	.....	.....	.....	.....	.....	.....	129	82	76	88	94	.....
11	.....	.....	.....	.....	.....	.....	136	101	115	82	129	210
12	.....	.....	.....	.....	.....	.....	192	122	70	82	122	248
13	.....	.....	.....	.....	.....	175	175	101	70	76	101	238
14	.....	.....	.....	.....	.....	210	144	122	76	76	101	.....
15	.....	.....	.....	.....	.....	184	184	115	76	76	94	.....
16	.....	.....	.....	.....	.....	184	136	88	76	76	94	248
17	.....	.....	.....	.....	.....	152	129	94	70	76	88	.....
18	.....	.....	.....	.....	.....	152	129	159	70	76	.....	.....
19	.....	.....	.....	.....	.....	159	129	122	70	76	159	248
20	.....	.....	.....	.....	.....	175	122	167	65	76	152	228
21	.....	.....	.....	.....	.....	159	108	159	65	70	.....	210
22	.....	.....	.....	.....	.....	152	108	94	82	70	.....	210
23	.....	.....	.....	.....	.....	.....	101	88	.....	70	.....	.....
24	.....	.....	.....	.....	.....	201	129	101	184	65	.....	.....
25	.....	.....	.....	.....	.....	.....	101	88	175	65	.....	.....
26	.....	.....	.....	.....	.....	210	101	82	88	65	.....	.....
27	.....	.....	.....	.....	.....	201	101	76	88	101	210	.....
28	.....	.....	.....	.....	.....	.....	101	88	.....	94	201	.....
29	.....	.....	.....	.....	.....	201	108	82	210	88	184	.....
30	.....	.....	.....	.....	.....	144	144	82	152	82	175	.....
31	.....	.....	.....	.....	.....	.....	115	82	.....	76	.....	.....
1908.												
1	.....	.....	.....	.....	.....	210	144	108	88	88	159	.....
2	.....	.....	.....	.....	.....	184	144	88	88	76	129	210
3	.....	.....	.....	248	.....	175	159	94	101	76	152	192
4	.....	248	.....	248	.....	184	248	88	101	76	144	159
5	.....	238	.....	.....	.....	210	192	108	.....	70	144	159
6	.....	.....	.....	248	.....	201	219	192	219	70	136	159
7	.....	238	.....	228	.....	167	210	129	152	70	136	.....
8	.....	228	248	228	.....	159	201	144	144	70	122	.....
9	.....	228	.....	219	.....	159	.....	159	129	219	122	.....
10	248	.....	.....	219	.....	159	238	129	115	228	115	.....

(See note at foot of table, next page.)

Daily discharge, in second-feet, of Cullasaja River at Cullasaja, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
11	.....	.....	.....	210	.....	159	219	122	88	101	192	248
12	.....	.....	.....	201	.....	184	219	108	88	88	144	.....
13	.....	.....	.....	192	248	159	219	101	88	88	115	248
14	.....	.....	.....	192	248	.....	192	94	88	88	201	210
15	.....	.....	248	.....	248	.....	175	88	101	88	175	201
16	.....	.....	248	.....	248	210	159	94	101	82	144	201
17	.....	.....	238	.....	248	201	159	115	101	76	136	201
18	.....	.....	228	.....	248	184	159	108	94	76	129	201
19	.....	.....	219	.....	.....	167	159	108	88	76	129	192
20	.....	.....	.....	.....	248	167	152	101	88	76	136	192
21	.....	.....	.....	.....	238	184	136	101	88	76	136	192
22	.....	.....	.....	238	219	167	129	.....	88	108	122	.....
23	.....	.....	.....	228	210	159	129	248	88	.....	122	.....
24	248	.....	.....	.....	228	.....	129	.....	88	219	115	.....
25	248	.....	.....	.....	219	159	129	.....	82	144	115	.....
26	248	.....	.....	.....	.....	152	136	.....	88	115	108	248
27	248	.....	.....	.....	248	144	115	210	88	.....	108	238
28	238	.....	.....	.....	228	144	144	201	129	.....	108	238
29	228	.....	.....	.....	228	144	129	192	88	.....	101	238
30	228	.....	.....	.....	219	144	129	159	88	.....	101	238
31	228	.....	.....	.....	210	.....	115	144	.....	.....	.....	248

NOTE.—Daily discharges for 1907 and 1908 based on a well-defined rating curve. On missing days, beginning June 13, 1907, the discharge was greater than 250 second-feet.

NANTAHALA RIVER NEAR NANTAHALA, N. C.

This station was established May 22, 1907, in cooperation with the Forest Service, though discharge measurements referred to a bench mark had been made before. It is at Mathew Cole's footbridge, about 1 mile up the river from Nantahala and just above Nelsons Creek.

A flume for transporting lumber, taking its water from a tributary creek several miles above, passes the station. The water flowing in the flume is measured when the station is visited and is usually about 10 to 12 second-feet. This flow is not included with the regular measurements.

The gage has the same datum as the bench marks formerly used.[a]

Discharge measurements of Nantahala River near Nantahala, N. C., in 1904 to 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1904.					
October 8	O. P. Hall	50	120	0.82	115
1907.					
May 22	F. A. Murray	64	208	1.76	388
August 23	F. P. Thomas	66	190	1.50	326
Do	do	66	190	1.50	323
October 17	O. P. Hall	60	171	1.25	231
1908.					
August 16	F. P. Thomas	65	180	1.29	217

[a] Records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Nantahala River near Nantahala, N. C., for 1907 and 1908.

[Observer, Mathew Cole.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.0	1.7	1.4	1.2	1.7	1.2	1.6
2	.....	.....	.....	.....	.....	2.35	1.7	1.4	1.2	1.55	2.05	1.6
3	.....	.....	.....	.....	.....	2.15	1.75	1.4	1.2	1.5	1.65	1.6
4	.....	.....	.....	.....	.....	2.0	1.7	1.4	1.2	1.5	1.5	1.5
5	.....	.....	.....	.....	.....	1.9	1.7	1.4	1.2	1.7	1.4	1.5
6	.....	.....	.....	.....	.....	1.9	1.7	1.4	1.2	1.45	1.4	1.5
7	.....	.....	.....	.....	.....	1.85	1.7	1.4	1.2	1.4	1.3	1.5
8	.....	.....	.....	.....	.....	2.55	1.7	1.3	1.25	1.6	1.3	1.5
9	.....	.....	.....	.....	.....	2.15	1.65	1.3	1.25	1.4	1.3	1.7
10	.....	.....	.....	.....	.....	2.0	1.5	1.3	1.1	1.35	2.3	2.5
11	.....	.....	.....	.....	.....	2.0	1.5	1.3	1.55	1.3	1.75	1.95
12	.....	.....	.....	.....	.....	1.9	2.15	1.3	1.3	1.3	1.6	1.9
13	.....	.....	.....	.....	.....	1.8	2.0	1.55	1.2	1.3	1.6	1.9
14	.....	.....	.....	.....	.....	1.8	1.75	1.5	1.15	1.25	1.5	2.45
15	.....	.....	.....	.....	.....	1.8	1.6	2.0	1.1	1.2	1.5	2.1
16	.....	.....	.....	.....	.....	1.7	1.6	1.65	1.1	1.2	1.5	2.0
17	.....	.....	.....	.....	.....	1.7	1.6	1.45	1.1	1.2	1.4	1.9
18	.....	.....	.....	.....	.....	1.7	1.6	1.5	1.05	1.2	1.4	1.9
19	.....	.....	.....	.....	.....	1.7	1.7	1.5	1.0	1.2	1.4	1.8
20	.....	.....	.....	.....	.....	1.7	1.7	1.4	1.0	1.2	1.4	1.8
21	.....	.....	.....	.....	.....	1.7	1.6	1.5	1.0	1.2	1.8	1.7
22	.....	.....	.....	.....	1.7	1.7	1.5	1.5	1.1	1.2	1.8	1.7
23	.....	.....	.....	.....	1.7	2.05	1.45	1.5	4.0	1.2	2.4	2.75
24	.....	.....	.....	.....	1.7	1.9	1.4	1.5	3.0	1.2	2.65	2.15
25	.....	.....	.....	.....	1.75	1.75	1.4	1.5	1.6	1.1	2.3	2.0
26	.....	.....	.....	.....	2.25	1.7	1.4	1.45	1.4	1.1	2.05	2.0
27	.....	.....	.....	.....	2.05	1.75	1.4	1.3	1.4	1.55	1.9	1.95
28	.....	.....	.....	.....	1.85	1.9	1.4	1.3	2.0	1.4	1.85	1.9
29	.....	.....	.....	.....	1.8	2.35	1.7	1.3	2.1	1.2	1.8	2.0
30	.....	.....	.....	.....	1.8	1.75	1.75	1.3	1.75	1.2	1.7	3.6
31	.....	.....	.....	.....	2.55	.....	1.5	1.25	.....	1.2	.....	2.75
1908.												
1	2.45	2.5	2.2	2.2	2.3	1.75	1.3	1.3	1.4	1.1	1.3	2.1
2	2.3	2.0	2.25	2.15	2.15	1.7	1.3	1.3	1.4	1.1	1.3	1.65
3	2.2	2.0	2.2	2.1	2.1	1.7	1.5	1.3	1.4	1.1	1.3	1.4
4	2.3	2.0	2.2	2.1	2.1	1.7	1.65	1.3	1.3	1.1	1.3	1.35
5	2.8	2.0	2.2	2.1	2.1	1.7	1.95	1.2	2.2	1.1	1.2	1.3
6	2.45	2.2	2.2	2.0	2.0	1.7	1.85	2.0	1.75	1.1	1.2	1.55
7	2.35	2.1	2.2	2.0	2.55	1.7	1.6	1.5	1.45	1.1	1.2	4.0
8	2.3	2.0	2.1	2.0	2.15	1.7	1.9	1.6	1.4	1.1	1.2	2.7
9	2.2	2.0	2.1	2.0	2.1	1.7	2.0	1.8	1.3	1.3	1.2	2.3
10	2.1	2.05	2.0	1.95	2.1	1.7	1.85	1.55	1.3	1.5	1.2	2.0
11	3.4	2.0	2.2	1.9	2.1	1.7	1.7	1.4	1.3	1.2	1.3	2.0
12	3.6	2.2	2.65	1.9	2.05	1.6	1.65	1.4	1.3	1.1	1.25	2.3
13	3.0	2.65	2.35	1.85	2.0	1.6	1.6	1.35	1.3	1.1	1.2	2.0
14	2.75	2.8	2.3	1.8	1.95	1.8	1.6	1.3	1.2	1.1	1.3	1.9
15	2.5	4.2	2.2	2.55	1.9	1.7	1.55	1.3	1.2	1.05	1.3	1.9
16	2.45	3.35	2.15	2.3	1.9	1.7	1.5	1.3	1.2	1.0	1.3	1.8
17	2.4	3.0	2.1	2.15	1.9	1.55	1.5	1.3	1.2	1.0	1.25	1.8
18	2.3	2.9	2.1	2.1	1.9	1.5	1.45	1.25	1.2	1.0	1.2	1.75
19	2.3	2.9	2.0	2.1	1.9	1.5	1.6	1.55	1.2	1.0	1.2	1.7
20	2.3	2.4	2.55	2.05	1.9	1.5	1.5	1.5	1.2	1.0	1.2	1.7
21	2.1	2.3	2.35	2.0	1.9	1.5	1.4	1.5	1.2	1.0	1.2	1.7
22	2.1	2.3	2.3	2.0	1.8	1.5	1.35	2.05	1.1	1.0	1.2	2.65
23	2.0	2.25	3.6	1.95	1.8	1.5	1.3	1.75	1.1	2.2	1.2	2.15
24	2.0	2.2	3.65	1.9	1.9	1.45	1.3	1.7	1.1	1.5	1.2	2.05
25	2.0	2.2	3.0	3.6	1.9	1.4	1.3	2.4	1.1	1.3	1.2	1.95
26	2.2	2.2	2.75	2.65	1.95	1.4	1.3	1.9	1.1	1.3	1.2	1.9
27	2.2	2.2	2.7	2.4	1.85	1.4	1.3	1.65	1.1	1.25	1.2	1.8
28	2.0	2.2	2.55	2.3	1.8	1.4	1.3	1.6	1.3	1.2	1.15	1.8
29	2.0	2.2	2.45	2.3	1.8	1.4	1.6	1.6	1.25	1.85	1.1	1.8
30	2.0	.....	2.4	2.3	1.8	1 3	1.45	1.5	1.1	1.5	1.1	1.8
31	2.0	.....	2.3	.....	1.8	.....	1.3	1.4	.....	1.4	.....	1.95

Daily discharge, in second-feet, of Nantahala River near Nantahala, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1							374	282	222	374	222	342
2							374	282	222	327		342
3							390	282	222	312	358	342
4						470	374	282	222	312	312	312
5						438	374	282	222	374	282	312
6						438	374	282	222	297	282	312
7						422	374	282	222	282	252	312
8							374	252	237	342	252	312
9							358	252	237	282	252	374
10						470	312	252	193	267		
11						470	312	252	327	252	390	454
12						438		252	252	252	342	438
13						406	470	312	222	252	342	438
14						406	390	312	208	237	312	
15						406	342	470	193	222	312	
16						374	342	358	193	222	312	
17						374	342	297	193	222	282	438
18						374	342	312	179	222	282	438
19						374	374	312	165	222	282	406
20						374	374	282	165	222	282	406
21						374	342	312	165	222	406	374
22					374	374	312	312	193	222	406	374
23					374		297	312		222		
24					374	438	282	312		222		
25					390	390	282	312	342	193		470
26						374	282	297	282	193		470
27						390	282	252	282	327	438	454
28					422	438	282	252	470	282	422	438
29					406		374	252		222	406	470
30					406	390	390	252	390	222	374	
31							312	237		222		
1908.												
1						390	252	252	282	193	252	
2		470				374	252	252	282	193	252	358
3		470				374	312	252	282	193	252	282
4		470				374	358	252	252	193	252	267
5		470				374	454	222		193	222	252
6				470	470	374	422	470	390	193	222	327
7				470		374	342	312	297	193	222	
8		470		470		374	438	342	282	193	222	
9		470		470		374	470	406	252	252	222	
10			470	454		374	422	327	252	312	222	470
11		470		438		374	374	282	252	222	252	470
12				438		342	358	282	252	193	237	
13				422	470	342	342	267	252	193	222	470
14				406	454	406	342	252	222	193	252	438
15					438	374	327	252		179	252	438
16					438	374	312	252		165	252	406
17					438	327	312	252		165	237	406
18					438	312	297	237		165	222	390
19			470		438	312	342	327		165	222	374
20					438	312	312	312		165	222	374
21				470	438	312	282	312	222	165	222	374
22				470	406	312	267		193	165	222	
23				454	406	312	252	390	193		222	
24				438	438	297	252	374	193	312	222	
25					438	282	252		193	252	222	454
26					454	282	252	438	193	252	222	438
27					422	282	252	358	193	237	222	406
28	470				406	282	252	342	252	222	208	406
29	470				406	282	342	342	237	422	193	406
30	470				406	252	297	312	193	312	193	406
31	470				406		252	282		282		454

NOTE.—Daily discharge for 1907 and 1908 based on a fairly well-defined rating curve. On missing days beginning May 22, 1907, the discharge was greater than 480 second-feet.

TUCKASEEGEE RIVER NEAR EAST LAPORT, N. C.

This station is located at the steel wagon bridge about 2½ miles downstream from East Laport, N. C. It was established May 27, 1907, in cooperation with the Forest Service. The station is about 2 miles below the mouth of Caney Fork.

Discharge measurements are made from the bridge. The current is good, and the bed is partly rock and should be fairly constant.[a]

Discharge measurements of Tuckaseegee River near East Laport, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 27	F. A. Murray	113	228	2.00	459
August 26	F. P. Thomas	107	172	1.20	220
Do	do	107	172	1.20	244
October 21	O. P. Hall	98	153	1.15	197
1908.					
April 17	Warren E. Hall	118	296	2.48	735
August 18	F. P. Thomas	110	198	1.58	324

Daily gage height, in feet, of Tuckaseegee River near East Laport, N. C., for 1907 and 1908.

[Observer, William Rogers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						3.2	1.8	1.4	1.4	1.5	1.2	1.6
2						2.4	1.7	1.3	1.3	1.5	2.1	1.5
3						2.2	2.0	1.3	1.3	1.5	1.5	1.4
4						2.1	1.8	1.3	1.2	1.5	1.2	1.3
5						2.0	1.7	1.3	1.2	1.5	1.2	1.2
6						1.9	1.7	1.3	1.1	1.4	1.2	1.2
7						1.9	1.6	1.3	1.1	1.4	1.2	1.2
8						2.8	1.5	1.4	1.3	1.3	1.1	1.2
9						2.1	1.5	1.4	1.2	1.3	1.1	1.4
10						2.0	1.5	1.4	1.1	1.3	1.5	3.9
11						1.8	1.6	1.4	1.1	1.3	1.4	2.5
12						1.8	2.0	1.4	1.1	1.3	1.4	2.0
13						1.8	1.8	1.4	1.1	1.2	1.3	2.0
14						1.9	1.6	1.4	1.1	1.2	1.3	4.0
15						1.8	1.6	1.4	1.1	1.2	1.3	3.0
16						1.7	1.7	1.5	1.1	1.2	1.3	2.5
17						1.6	1.7	1.5	1.1	1.2	1.3	2.4
18						1.6	1.6	1.6	1.1	1.2	1.6	2.3
19						1.9	1.5	1.5	1.1	1.2	1.5	2.0
20						1.7	1.5	1.4	1.0	1.2	1.5	2.0
21						1.7	1.6	1.3	1.1	1.2	3.5	1.8
22						1.8	1.6	1.3	1.1	1.2	2.2	1.7
23						1.9	1.5	1.3	5.0	1.2	3.4	5.0
24						2.0	1.4	1.3	3.0	1.2	3.5	4.0
25						2.1	1.5	1.2	2.0	1.2	2.2	3.0
26						1.9	1.5	1.2	1.4	1.2	2.0	2.5
27					2.0	1.8	1.4	1.2	1.4	1.2	2.0	2.4
28					1.9	2.0	1.4	1.2	1.3	1.2	1.9	2.2
29					1.8	2.0	1.4	1.2	1.3	1.2	1.9	2.0
30					1.8	1.8	1.7	1.2	1.3	1.2	1.7	4.0
31					2.0	.....	1.4	1.2	.....	1.2	.....	3.0

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Tuckaseegee River near East Laport, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	2.6	3.0	2.0	2.4	2.5	2.0	1.5	1.6	1.6	1.2	1.7	1.5
2	2.5	2.7	2.0	2.3	2.5	2.0	1.5	1.5	1.6	1.2	1.7	1.6
3	2.2	2.6	2.0	2.3	2.4	2.0	1.7	1.5	1.5	1.2	1.6	1.5
4	2.1	2.3	2.1	2.2	2.3	2.0	1.7	1.5	1.5	1.2	1.6	1.5
5	2.9	2.2	2.2	2.2	2.3	1.9	2.6	1.6	1.5	1.2	1.5	1.5
6	2.7	2.4	2.4	2.2	2.3	1.9	2.2	1.9	1.9	1.1	1.5	1.5
7	2.6	2.3	2.3	2.2	4.5	1.8	2.5	1.8	1.8	1.1	1.5	5.0
8	2.4	2.2	2.3	2.2	3.0	1.8	2.6	1.7	1.8	1.1	1.4	3.0
9	2.2	2.2	2.3	2.2	2.9	1.8	2.6	1.6	1.7	1.2	1.4	2.7
10	2.1	2.2	2.2	2.1	2.6	2.4	2.5	1.5	1.6	2.5	1.4	2.4
11	7.0	2.3	2.2	2.1	2.4	2.1	2.4	1.9	1.5	2.0	1.4	2.0
12	5.5	3.0	3.0	2.1	2.3	2.0	2.1	1.4	1.5	1.3	1.4	2.5
13	4.0	3.4	2.5	2.0	2.2	2.0	1.9	1.4	1.5	1.3	1.4	2.0
14	3.4	3.6	2.5	2.0	2.2	2.1	1.8	1.4	1.4	1.3	1.6	1.9
15	3.0	9.6	2.4	4.0	2.1	2.3	1.7	1.5	1.4	1.3	1.5	1.8
16	2.9	4.0	2.4	3.0	2.1	1.9	2.0	1.5	1.4	1.2	1.5	1.7
17	2.8	3.2	2.3	2.8	2.2	1.8	1.9	1.5	1.4	1.2	1.5	1.7
18	2.6	3.0	2.3	2.5	2.2	1.8	1.8	1.4	1.3	1.2	1.5	1.6
19	2.6	3.0	2.2	2.4	2.1	1.7	1.7	1.4	1.3	1.1	1.5	1.6
20	2.5	2.8	2.2	2.3	2.1	1.9	1.6	1.9	1.3	1.1	1.5	1.6
21	2.4	2.7	3.0	2.2	2.1	1.8	1.6	2.0	1.3	1.1	1.5	1.5
22	2.3	2.6	2.9	2.1	2.0	1.7	1.5	3.4	1.3	1.1	1.4	2.0
23	2.3	2.6	2.7	2.1	2.0	1.7	1.5	2.7	1.3	2.6	1.4	3.5
24	2.2	2.5	4.2	2.0	2.1	1.7	1.5	2.3	1.2	2.0	1.4	2.5
25	2.1	2.4	3.5	6.4	2.0	1.7	1.4	3.7	1.2	1.5	1.4	2.3
26	2.2	2.2	3.0	2.0	2.0	1.7	1.3	2.6	1.2	1.4	1.4	2.2
27	2.2	2.0	3.0	3.0	2.4	1.6	1.5	2.5	1.3	1.4	1.4	2.0
28	2.2	2.5	2.9	2.7	2.5	1.6	1.6	2.4	1.3	2.2	1.4	2.0
29	2.1	2.0	2.6	2.6	2.6	1.6	1.7	2.1	1.2	2.9	1.4	2.0
30	2.1	.....	2.5	2.5	2.4	1.5	1.7	1.9	1.2	2.0	1.5	2.1
31	2.1	.....	2.5	.....	2.1	.....	1.6	1.6	.....	1.8	.....	2.3

Daily discharge, in second-feet, of Tuckaseegee River near East Laport, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	390	265	265	295	205	325
2	.....	.....	.....	.....	.....	.....	355	235	235	295	510	295
3	.....	.....	.....	.....	.....	560	470	235	235	295	295	265
4	.....	.....	.....	.....	.....	510	390	235	205	295	205	235
5	.....	.....	.....	.....	.....	470	355	235	205	295	205	235
6	.....	.....	.....	.....	.....	430	355	235	180	265	205	235
7	.....	.....	.....	.....	.....	430	325	235	180	265	205	235
8	.....	.....	.....	.....	.....	.....	295	265	235	235	180	235
9	.....	.....	.....	.....	.....	510	295	265	205	235	180	265
10	.....	.....	.....	.....	.....	470	295	265	180	235	295	.....
11	.....	.....	.....	.....	.....	390	325	265	180	235	265	.....
12	.....	.....	.....	.....	.....	390	470	265	180	235	265	470
13	.....	.....	.....	.....	.....	390	390	265	180	205	235	470
14	.....	.....	.....	.....	.....	430	325	265	180	205	235	.....
15	.....	.....	.....	.....	.....	390	325	265	180	205	235	.....
16	.....	.....	.....	.....	.....	355	355	295	180	205	235	.....
17	.....	.....	.....	.....	.....	325	355	295	180	205	235	.....
18	.....	.....	.....	.....	.....	325	325	325	180	205	325	610
19	.....	.....	.....	.....	.....	430	295	295	180	205	295	470
20	.....	.....	.....	.....	.....	355	295	265	160	205	295	470
21	.....	.....	.....	.....	.....	355	325	235	180	205	.....	390
22	.....	.....	.....	.....	.....	390	325	235	180	205	560	355
23	.....	.....	.....	.....	.....	430	295	235	.....	205	.....	.....
24	.....	.....	.....	.....	.....	470	265	235	.....	205	.....	.....
25	.....	.....	.....	.....	.....	510	295	205	470	205	560	.....
26	.....	.....	.....	.....	.....	430	295	205	265	205	470	.....
27	.....	.....	.....	.....	470	390	265	205	265	205	470	.....
28	.....	.....	.....	.....	430	470	265	205	235	205	430	560
29	.....	.....	.....	.....	390	470	265	205	235	205	430	470
30	.....	.....	.....	.....	390	390	355	205	235	205	355	.....
31	.....	.....	.....	.....	470	.....	265	205	.....	205	.....	.....

(See note at foot of table on next page.)

Daily discharge, in second-feet, of Tuckaseegee River near East Laport, N. C., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	.....	.....	470	.....	.....	470	295	325	325	205	355	295
2	.....	.....	470	610	.....	470	295	295	325	205	355	325
3	560	.....	470	610	.....	470	355	295	295	205	325	295
4	510	610	510	560	610	470	355	295	295	205	325	295
5	.....	560	560	560	610	430	.....	325	295	205	295	295
6	.....	.....	.....	560	610	430	560	430	430	180	295	295
7	.....	610	610	560	.....	390	.....	390	390	180	295	.....
8	.....	560	610	560	.....	390	.....	355	390	180	265	.....
9	560	560	610	560	.....	390	.....	325	355	205	265	.....
10	510	560	560	510	.....	.....	.....	295	325	.....	265	.....
11	.....	610	560	510	.....	510	.....	430	295	470	265	470
12	.....	.....	.....	510	610	470	510	265	295	235	265	.....
13	.....	.....	.....	470	560	470	430	265	295	235	265	470
14	.....	.....	.....	470	560	510	390	265	265	235	325	430
15	.....	.....	.....	.....	510	610	355	295	265	235	295	390
16	.....	.....	.....	.....	510	430	470	295	265	205	295	355
17	.....	.....	610	.....	560	390	430	295	265	205	295	355
18	.....	.....	610	.....	560	390	390	265	235	205	295	325
19	.....	.....	560	.....	510	355	355	265	235	180	295	325
20	.....	.....	560	610	510	430	325	430	235	180	295	325
21	.....	.....	.....	560	510	390	325	470	235	180	295	295
22	610	.....	.....	510	470	355	295	.....	235	180	265	470
23	610	.....	.....	510	470	355	295	.....	235	.....	265	.....
24	560	.....	.....	470	510	355	295	610	205	470	265	.....
25	510	.....	.....	.....	470	355	265	.....	205	295	265	610
26	560	560	.....	470	470	355	235	.....	205	265	265	560
27	560	470	.....	.....	.....	325	295	.....	235	265	265	470
28	560	.....	.....	.....	.....	325	325	.....	235	560	265	470
29	510	470	.....	.....	.....	325	355	510	205	.....	265	470
30	510	.....	.....	.....	.....	295	355	430	205	470	295	510
31	510	.....	.....	.....	510	.....	325	325	.....	390	.....	610

NOTE.—Daily discharge for 1907 and 1908 based on a well-defined rating curve. On missing days beginning May 27, 1907, the discharge was greater than 650 second-feet.

TUCKASEEGEE RIVER AT BRYSON, N. C.

This station is located at the highway bridge in the town of Bryson, N. C., one-half mile below the mouth of Deep Creek. The original station was established in June, 1896, at the Southern Railway bridge 3 miles above Bryson, but was abandoned early in 1897 on account of poor section for measurements. The present station was established November 7, 1897, and has been maintained continuously since that time. This station furnishes data especially useful for a number of purposes, including estimates of water power, which is very abundant both above and below the station.

Bryson is about 15 miles above the mouth of Tuckaseegee River where it joins Little Tennessee River. Oconolufty River is an important tributary coming in about 8 miles above Bryson.

Discharge measurements are made at the bridge where the current and other conditions are good. The gage datum has not been changed.[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Tuckaseegee River at Bryson, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 24	F. A. Murray	190	950	1.80	1,440
August 23	F. P. Thomas	190	827	1.37	1,010
October 19	O. P. Hall	190	834	1.22	686
1908.					
August 19	F. P. Thomas	190	787	1.29	884

Daily gage height, in feet, of Tuckaseegee River at Bryson, N. C., for 1907 and 1908.

[Observer, J. M. Welch.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.8	2.6	2.9	1.7	1.8	2.9	1.7	1.35	1.2	1.6	1.2	1.65
2	2.6	2.2	3.2	1.6	1.75	2.3	1.85	1.3	1.15	1.5	2.3	1.6
3	2.4	2.1	2.4	1.6	2.4	2.1	1.9	1.3	1.25	1.5	1.7	1.5
4	2.3	2.25	2.1	1.6	2.5	1.9	1.7	1.3	1.3	1.45	1.4	1.5
5	2.25	2.9	2.0	2.1	2.1	1.8	1.6	1.3	1.3	1.85	1.35	1.4
6	2.2	2.4	2.0	2.0	2.3	1.75	1.6	1.35	1.2	1.5	1.35	1.5
7	2.1	2.2	2.5	1.9	2.8	1.7	1.5	1.3	1.2	1.4	1.3	1.5
8	2.1	2.1	2.3	1.8	2.4	3.0	1.5	1.45	1.6	1.5	1.3	1.45
9	2.0	2.0	2.1	1.8	2.3	2.1	1.45	1.3	1.35	1.4	1.25	2.65
10	2.0	2.0	3.0	1.7	2.2	2.0	1.4	1.8	1.25	1.35	2.3	2.8
11	1.95	1.9	2.4	1.65	2.6	1.9	1.45	1.4	1.65	1.3	1.85	2.1
12	1.95	1.85	2.2	1.7	2.3	1.8	2.45	1.45	1.4	1.3	1.6	1.8
13	1.9	1.85	2.1	1.6	2.1	1.8	1.9	1.45	1.25	1.3	1.5	1.75
14	1.9	1.8	2.2	1.6	2.1	1.9	1.6	1.35	1.2	1.3	1.5	2.65
15	1.85	1.7	2.2	1.6	2.2	1.8	1.8	1.5	1.2	1.25	1.4	2.25
16	1.8	1.7	2.0	1.8	2.0	1.7	1.7	1.65	1.2	1.25	1.4	2.05
17	1.9	1.7	2.0	1.75	1.9	1.65	2.45	1.5	1.2	1.25	1.4	1.9
18	1.8	1.7	1.95	1.7	1.9	1.6	1.9	1.55	1.2	1.2	1.7	1.9
19	1.8	1.7	1.9	2.45	1.8	1.7	1.65	1.4	1.2	1.2	1.75	1.8
20	2.1	1.7	1.85	1.9	1.8	1.6	1.6	1.3	1.1	1.2	1.6	1.7
21	1.8	1.7	1.8	1.8	1.75	1.55	1.55	1.5	1.1	1.2	2.45	1.7
22	1.8	1.65	1.75	2.0	1.7	1.7	1.50	1.5	1.5	1.2	2.0	1.65
23	1.75	1.65	1.7	2.65	1.9	2.0	1.4	1.4	4.2	1.2	3.25	3.85
24	1.7	1.8	1.7	2.1	1.9	1.8	1.4	1.5	2.05	1.2	3.45	3.55
25	1.7	1.85	1.7	2.0	1.8	1.9	1.45	1.4	1.7	1.2	2.55	2.35
26	1.8	2.1	1.8	1.9	2.1	1.8	1.4	1.4	1.5	1.2	2.2	2.1
27	1.7	2.0	1.7	2.2	1.9	1.65	1.4	1.3	1.45	1.45	2.0	2.0
28	1.7	2.9	1.65	2.0	1.8	3.2	1.5	1.3	1.4	1.35	1.9	1.9
29	1.7	.....	1.65	1.9	1.7	2.2	1.6	1.25	2.4	1.2	1.8	1.9
30	1.65	.....	1.6	1.9	1.7	1.8	1.5	1.2	1.8	1.2	1.7	4.3
31	1.7	.....	1.8	.....	2.2	.....	1.4	1.2	.....	1.2	.....	2.9
1908.												
1	2.55	2.3	2.4	2.2	2.45	1.9	1.4	1.3	1.45	1.15	1.55	1.85
2	2.3	1.95	2.45	2.2	2.3	1.8	1.4	1.3	1.4	1.1	1.5	1.7
3	2.2	1.85	2.5	2.2	2.2	1.8	1.75	1.3	1.4	1.1	1.4	1.5
4	2.25	1.9	2.45	2.15	2.1	2.1	1.85	1.3	1.4	1.1	1.4	1.4
5	3.0	1.9	2.45	2.1	2.05	1.9	2.25	1.45	1.95	1.1	1.3	1.35
6	2.45	2.1	2.45	2.1	2.1	1.8	2.2	2.5	2.0	1.1	1.3	1.5
7	2.3	1.9	2.5	2.0	3.15	1.8	2.0	1.8	1.6	1.1	1.25	5.0
8	2.2	1.9	2.5	2.0	2.45	1.7	2.15	1.65	1.5	1.1	1.25	2.75
9	2.1	1.85	2.4	1.95	2.3	1.7	2.2	1.7	1.4	1.4	1.2	2.15
10	2.0	1.9	2.3	1.9	2.2	1.7	2.2	1.6	1.4	1.9	1.2	1.9
11	2.5	2.0	2.2	1.9	2.1	2.0	1.95	1.5	1.35	1.35	1.4	1.8
12	4.6	2.45	3.1	1.8	2.05	1.75	1.8	1.4	1.3	1.2	1.45	2.5
13	3.25	2.8	2.5	1.8	2.0	1.7	1.7	1.3	1.3	1.2	1.3	1.95
14	2.95	3.15	2.4	1.8	2.0	1.8	1.7	1.3	1.3	1.15	1.3	1.8
15	2.55	6.6	2.3	2.5	2.0	1.95	1.6	1.4	1.3	1.15	1.5	1.7
16	2.5	3.85	2.2	2.5	1.95	1.8	1.65	1.4	1.25	1.1	1.4	1.7
17	2.4	3.2	2.1	2.3	2.1	1.7	1.6	1.45	1.25	1.1	1.3	1.6
18	2.3	2.85	2.1	2.2	2.2	1.6	1.5	1.5	1.25	1.1	1.3	1.6
19	2.2	2.85	2.0	2.25	2.95	1.6	1.85	1.4	1.2	1.1	1.3	1.6
20	2.1	2.6	2.65	2.1	2.35	1.6	1.5	1.4	1.2	1.1	1.3	1.5

Daily gage height, in feet, of Tuckaseegee River at Bryson, N. C., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	2.1	2.55	3.2	2.0	2.2	1.6	1.4	1.3	1.2	1.1	1.3	1.5
22	2.1	2.35	2.75	1.9	2.1	1.6	1.45	2.55	1.2	1.1	1.3	2.9
23	2.0	2.35	3.7	1.9	2.0	1.6	1.45	1.85	1.2	1.85	1.25	2.5
24	1.9	2.2	4.6	1.9	2.2	1.6	1.5	2.0	1.2	1.6	1.25	2.15
25	1.9	2.25	3.4	4.9	2.05	1.85	1.4	2.95	1.15	1.4	1.2	2.2
26	1.9	2.35	2.95	3.4	2.15	1.6	1.4	2.2	1.15	1.25	1.2	2.05
27	2.1	2.2	2.75	2.9	2.1	1.5	1.4	1.85	1.1	1.1	1.2	1.9
28	1.9	2.0	2.6	2.65	2.05	1.5	1.5	1.7	1.25	1.4	1.2	1.95
29	1.9	2.1	2.45	2.45	2.45	1.4	1.5	1.6	1.2	2.3	1.2	2.0
30	1.8	.....	2.3	2.5	2.25	1.4	1.4	1.55	1.15	1.9	1.2	1.95
31	1.8	.....	2.3	.....	1.95	.....	1.4	1.5	.....	1.6	.....	2.5

Rating table for Tuckaseegee River at Bryson, N. C., for 1904 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.10	550	2.40	2,300	3.70	5,040	5.00	8,800
1.20	650	2.50	2,480	3.80	5,290	5.20	9,475
1.30	750	2.60	2,660	3.90	5,540	5.40	10,250
1.40	860	2.70	2,850	4.00	5,800	5.60	11,125
1.50	980	2.80	3,050	4.10	6,070	5.80	12,100
1.60	1,100	2.90	3,250	4.20	6,350	6.00	13,200
1.70	1,230	3.00	3,460	4.30	6,630	6.20	14,360
1.80	1,370	3.10	3,670	4.40	6,920	6.40	15,520
1.90	1,510	3.20	3,890	4.50	7,220	6.60	16,680
2.00	1,660	3.30	4,110	4.60	7,530	6.80	17,840
2.10	1,810	3.40	4,330	4.70	7,840		
2.20	1,970	3.50	4,560	4.80	8,160		
2.30	2,130	3.60	4,800	4.90	8,480		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon discharge measurements made during 1904 to 1907 and is well defined below gage height 3.0 feet. Above gage height 6.0 feet the rating curve is a tangent, the difference being 580 per tenth. Above gage height 3.0 feet the table is the same as for 1903, and above 5.0 feet the same as for 1901–2.

Monthly discharge of Tuckaseegee River at Bryson, N. C., for 1907 and 1908.

[Drainage area, 662 square miles.]

Month.	Discharge in second-feet.			Per square mile.	Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.			
1907.						
January	3,050	1,160	1,620	2.45	2.82	B.
February	3,250	1,160	1,690	2.55	2.66	B.
March	3,890	1,100	1,810	2.73	3.15	B.
April	2,760	1,100	1,480	2.24	2.50	B.
May	3,050	1,230	1,760	2.66	3.07	B.
June	3,890	1,040	1,640	2.48	2.77	B.
July	2,390	860	1,170	1.77	2.04	B.
August	1,370	650	861	1.30	1.50	B.
September	6,350	550	1,060	1.60	1.78	B.
October	1,440	650	791	1.19	1.37	B.
November	4,440	650	1,480	2.24	2.50	B.
December	6,630	860	1,980	2.99	3.45	B.
The year	6,630	550	1,450	2.18	29.61	
1908.						
January	7,530	1,370	2,260	3.41	3.93	B.
February	16,700	1,440	2,780	4.20	4.53	B.
March	7,530	1,660	2,760	4.17	4.81	B.
April	8,480	1,370	2,210	3.34	3.73	B.
May	3,780	1,580	2,010	3.04	3.50	B.
June	1,810	860	1,260	1.90	2.12	B.
July	2,050	860	1,230	1.86	2.14	B.
August	3,360	750	1,210	1.83	2.11	B.
September	1,660	550	802	1.21	1.35	B.
October	2,130	550	783	1.18	1.36	B.
November	1,040	650	762	1.15	1.28	B.
December	8,800	805	1,810	2.73	3.15	B.
The year	16,700	550	1,660	2.50	34.01	

SCOTTS CREEK NEAR DILLSBORO, N. C.

This station was established August 26, 1907, in cooperation with the Forest Service. It is at a footbridge about 1 mile from Dillsboro, and about the same distance above the mouth of the creek which is a large tributary of Tuckaseegee River.

The discharge measurements are made from the footbridge, where the current is mostly swift and the bed is fairly constant.

The station was discontinued on June 30, 1908.[a]

Discharge measurements of Scotts Creek near Dillsboro, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 26	F. A. Murray	39	66	1.63	85
October 21	O. P. Hall	40	63	1.61	79
1908.					
April 16	Warren E. Hall	40	86	2.10	171

Daily gage height, in feet, of Scotts Creek near Dillsboro, N. C., for 1907 and 1908.

[Observer, E. B. Monleith.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	1.6	1.8	1.6	1.8	16	.....	1.65	1.6	1.7	1.9
2	.....	1.6	1.8	2.05	1.8	17	.....	1.65	1.6	1.7	1.85
3	.....	2.1	1.7	1.75	1.8	18	.....	1.6	1.6	2.05	1.8
4	.....	1.75	1.8	1.65	1.8	19	.....	1.6	1.6	1.8	1.8
5	.....	1.65	1.9	1.65	1.7	20	.....	1.6	1.6	1.75	1.75
6	.....	1.6	1.8	1.6	1.8	21	.....	1.6	1.6	2.0	1.8
7	.....	1.6	1.75	1.6	1.75	22	.....	2.6	1.6	1.95	1.8
8	.....	2.25	1.8	1.6	1.7	23	.....	2.85	1.6	2.7	2.2
9	.....	1.7	1.7	1.6	1.9	24	.....	1.8	1.6	2.3	2.0
10	.....	1.7	1.7	2.35	2.35	25	.....	1.7	1.6	2.1	1.9
11	.....	1.75	1.7	1.85	2.0	26	1.6	1.7	1.6	2.0	1.9
12	.....	1.7	1.7	1.8	1.9	27	1.6	1.7	1.85	2.0	1.9
13	.....	1.65	1.65	1.8	1.95	28	1.65	2.1	1.7	1.9	1.9
14	.....	1.6	1.6	1.7	2.0	29	1.6	2.0	1.6	1.9	1.9
15	.....	1.6	1.6	1.7	1.9	30	1.6	1.85	1.6	1.8	2.8
						31	1.6	.....	1.6	.....	2.2

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	2.0	3.8	2.15	2.2	2.1	1.9	16	2.2	2.45	2.0	2.1	2.05	1.9
2	2.0	1.9	2.15	2.1	2.1	1.9	17	2.1	2.35	2.0	2.0	2.1	1.9
3	2.0	1.9	2.1	2.1	2.1	1.95	18	2.1	2.3	2.0	2.1	2.1	1.85
4	2.45	2.0	2.1	2.1	2.0	1.95	19	2.0	2.3	2.05	2.05	2.4	1.8
5	2.2	2.0	2.1	2.2	2.0	1.9	20	2.0	2.2	2.6	2.0	2.1	1.85
6	2.1	2.05	2.1	2.1	2.0	1.9	21	2.0	2.2	2.45	2.0	2.05	1.9
7	2.1	2.0	2.1	2.1	2.45	1.9	22	2.0	2.1	2.3	1.95	2.0	1.8
8	2.0	1.95	2.1	2.1	2.15	1.85	23	2.0	2.1	3.4	1.95	2.25	1.8
9	2.0	1.9	2.0	2.05	2.1	1.85	24	1.95	2.0	2.9	1.9	2.1	1.9
10	2.0	2.0	2.0	2.0	2.1	1.85	25	1.95	2.05	2.6	3.0	2.15	1.8
11	2.55	2.1	2.15	2.0	2.0	1.8	26	2.0	2.1	2.45	2.35	2.1	1.8
12	2.45	2.15	2.4	2.0	2.0	1.8	27	2.0	2.0	2.4	2.25	2.0	1.8
13	2.25	2.2	2.1	1.95	2.0	1.95	28	1.9	2.0	2.3	2.15	2.15	1.7
14	2.2	2.65	2.1	1.95	2.0	2.05	29	1.9	2.1	2.25	2.1	2.1	1.7
15	2.2	3.0	2.05	2.3	2.0	2.15	30	1.9	.....	2.2	2.2	2.0	1.7
							31	1.9	.....	2.2	.....	2.0	.....

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily discharge, in second-feet, of Scotts Creek near Dillsboro, N. C., for 1907 and 1908.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	78	110	78	110	16	.....	85	78	92	130
2	.....	78	110	160	110	17	.....	85	78	92	120
3	.....	170	92	101	110	18	.....	78	78	160	110
4	.....	101	110	85	110	19	.....	78	78	110	110
5	.....	85	130	85	92	20	.....	78	78	101	101
6	.....	78	110	78	110	21	.....	78	78	150	110
7	.....	78	101	78	101	22	.....	.....	78	140	110
8	.....	200	110	78	92	23	.....	.....	78	.....	190
9	.....	92	92	78	130	24	.....	110	78	210	150
10	.....	92	92	.....	.....	25	.....	92	78	170	130
11	.....	101	92	120	150	26	78	92	78	150	130
12	.....	92	92	110	130	27	78	92	120	150	130
13	.....	85	85	110	140	28	85	170	92	130	130
14	.....	78	78	92	150	29	78	150	78	130	130
15	.....	78	78	92	130	30	78	120	78	110	.....
						31	78	.....	78	.....	190

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	150	.....	180	190	170	130	16	190	.....	150	170	160	130
2	150	130	180	170	170	130	17	170	.....	150	150	170	130
3	150	130	170	170	170	140	18	170	210	150	170	170	120
4	.....	150	170	170	150	140	19	150	210	160	160	.....	110
5	190	150	170	190	150	130	20	150	190	.....	150	170	120
6	170	160	170	170	150	130	21	150	190	.....	150	160	130
7	170	150	170	170	.....	130	22	150	170	210	140	150	110
8	150	140	170	170	180	120	23	150	170	.....	140	200	110
9	150	130	150	160	170	120	24	140	150	.....	130	170	130
10	150	150	150	150	170	120	25	140	160	.....	.....	180	110
11	.....	170	180	150	150	110	26	150	170	.....	.....	170	110
12	.....	180	.....	150	150	110	27	150	150	.....	200	150	110
13	200	190	170	140	150	140	28	130	150	210	180	180	92
14	190	.....	170	140	150	160	29	130	170	200	170	170	92
15	190	.....	160	210	150	180	30	130	.....	190	190	150	92
							31	130	.....	190	.....	150	.....

NOTE.—Daily discharges for 1907 and 1908 based on an approximate rating curve. On missing days, August 26, 1907, to June 30, 1908, the discharge was greater than 220 second-feet.

OCONOLUFTY RIVER NEAR CHEROKEE, N. C.

This station was established August 27, 1907, in cooperation with the Forest Service. It is located about 500 feet below the mouth of Soco Creek, a large tributary of Oconolufty River, and 1½ miles from Cherokee post-office. A flume for transporting lumber and wood, taking its water from tributary streams, generally uses 10 or 12 second-feet of water which is not included in the station records.

Discharge measurements are made from a boat at ordinary times but can also be made in two parts by measuring Soco Creek and the river above the junction, both measurements being made from bridges.

The station was discontinued on June 30, 1908.[a]

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Discharge measurements of Oconolufty River near Cherokee, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907.					
August 27	F. A. Murray	100	250	1.81	237
October 19	O. P. Hall	98	230	1.67	232
1908.					
April 20	Warren E. Hall			2.43	546

Daily gage height, in feet, of Oconolufty River near Cherokee, N. C., for 1907 and 1908.

[Observer, W. R. Maney.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1		1.7	2.7	2.8	2.1	16		1.8	1.7	2.65	2.3
2		1.7	2.6	2.5	2.1	17		1.75	1.7	2.6	2.2
3		1.7	2.5	2.45	2.0	18		1.8	1.65	2.9	2.2
4		1.7	1.9	2.45	2.0	19		1.75	1.65	2.6	2.0
5		1.65	2.0	2.4	1.95	20		1.60	1.65	2.1	1.95
6		1.6	2.0	2.35	1.9	21		1.6	1.6	2.75	3.2
7		1.6	2.1	2.3	1.9	22		2.4	1.6	2.5	3.0
8		1.95	2.0	2.25	1.9	23		3.6	1.6	5.3	3.3
9		1.85	1.9	2.2	1.85	24		3.0	1.6	4.0	2.1
10		1.75	1.85	3.2	3.0	25		2.8	1.55	3.4	2.1
11		2.4	1.8	2.2	2.75	26		2.75	1.55	3.1	2.1
12		1.85	1.8	2.15	2.35	27	1.8	2.0	1.7	2.85	2.1
13		1.8	1.8	2.1	2.5	28	1.95	3.0	1.7	2.7	2.1
14		1.8	1.75	2.8	2.4	29	1.8	2.8	1.65	2.5	2.8
15		1.8	1.7	2.75	2.4	30	1.75	2.75	1.65	2.1	5.0
						31	1.7		1.6		3.1

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	3.0	2.2	2.4	2.1	2.3	2.3	16	2.15	4.2	2.1	3.1	2.15	2.15
2	3.4	2.3	3.0	2.15	2.2	2.2	17	2.2	3.1	2.1	2.1	3.0	2.1
3	2.8	2.3	2.4	2.1	2.1	2.1	18	2.2	3.0	2.15	2.1	2.1	2.15
4	2.8	2.3	2.3	2.1	2.1	2.3	19	2.1	2.3	2.1	2.15	4.0	2.1
5	3.0	2.2	2.1	2.15	2.15	2.1	20	2.1	2.2	4.2	2.1	3.0	2.3
6	2.8	2.1	3.0	2.1	2.1	2.2	21	2.15	2.15	3.1	2.15	2.1	2.2
7	2.1	2.2	3.0	2.2	3.5	2.3	22	2.2	2.1	3.15	2.2	2.15	3.1
8	2.15	2.1	2.4	2.15	2.1	2.1	23	2.2	2.1	4.2	2.3	2.1	2.15
9	2.15	2.1	2.1	2.1	2.15	2.1	24	2.2	2.15	3.0	2.1	2.15	2.1
10	2.15	2.2	2.1	2.2	2.1	2.15	25	2.15	2.1	3.1	7.0	2.2	3.5
11	3.1	2.2	2.15	2.2	2.1	2.1	26	2.15	2.15	3.15	3.1	2.1	2.1
12	3.1	2.1	2.4	2.1	2.15	2.1	27	2.2	2.15	2.1	3.2	2.15	2.15
13	3.1	3.0	3.0	2.15	2.1	2.15	28	2.3	2.1	2.1	2.1	2.2	2.1
14	3.3	3.1	2.4	2.1	2.2	2.3	29	2.1	2.15	2.15	2.1	3.0	2.0
15	2.15	7.0	2.1	3.1	2.1	2.1	30	2.15		2.1	2.1	2.15	2.1
							31	2.1		2.15		2.2	

Daily discharge, in second-feet, of Oconolufty River near Cherokee, N. C., for 1907 and 1908.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	220	.....	.....	390	16	.....	260	220	.....	485
2	.....	220	.....	585	390	17	.....	240	220	.....	435
3	.....	220	585	560	345	18	.....	260	202	.....	435
4	.....	220	300	560	345	19	.....	240	202	.....	345
5	.....	202	345	535	322	20	.....	185	202	390	322
6	.....	185	345	510	300	21	.....	185	185	.....	.....
7	.....	185	390	485	300	22	.....	535	185	585	.....
8	.....	322	345	460	300	23	.....	.....	185	.....	.....
9	.....	280	300	435	280	24	.....	.....	185	.....	390
10	.....	240	280	.....	.....	25	.....	.....	170	.....	390
11	.....	535	260	435	.....	26	.....	.....	170	.....	390
12	.....	280	260	412	510	27	260	345	220	.....	390
13	.....	260	260	390	585	28	322	.....	220	.....	390
14	.....	260	240	.....	535	29	260	.....	202	585	.....
15	.....	260	220	.....	535	30	240	.....	202	390	.....
						31	220	.....	185	.....	.....

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	.....	435	535	390	485	485	16	412	.....	390	.....	412	412
2	.....	485	.....	412	435	435	17	435	.....	390	390	.....	390
3	.....	485	535	390	390	390	18	435	.....	412	390	390	412
4	.....	485	485	390	390	485	19	390	485	390	412	.....	390
5	.....	435	390	412	412	390	20	390	435	.....	390	.....	485
6	.....	390	.....	390	390	435	21	412	412	.....	412	390	435
7	390	435	.....	435	.....	485	22	435	390	.....	435	412	.....
8	412	390	535	412	390	390	23	435	390	.....	485	390	412
9	412	390	390	390	412	390	24	435	412	.....	390	412	390
10	412	435	390	435	390	412	25	412	390	.....	.....	435	.....
11	.....	435	412	435	390	390	26	412	412	.....	.....	390	390
12	.....	390	535	390	412	390	27	435	412	390	.....	412	412
13	.....	.....	.....	412	390	412	28	485	390	390	390	435	390
14	.....	.....	535	390	435	485	29	390	412	412	390	.....	345
15	412	.....	390	.....	390	390	30	412	.....	390	390	412	390
							31	390	.....	412	.....	435	.....

NOTE.—Daily discharge for 1907 and 1908, based on an approximate rating curve. On missing days August 27, 1907, to June 30, 1908, the discharge was greater than 600 second-feet.

CHEOAH RIVER AT MILLSAPS, N. C.

This station was established on August 24, 1907, in cooperation with the Forest Service. It is located about 500 feet above the mouth of Snowbird Creek, which is a large tributary.

Discharge measurements are made from a boat or by wading.

Measurements are also made of Snowbird Creek which, together with these at the gage, give the flow of the river below the junction. The records published for the station are for the Cheoah River above Snowbird Creek.

The station was discontinued on June 30, 1908.[a]

Discharge measurements of Cheoah River at Millsaps, N. C., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
August 24	F. A. Murray	64	101	1.50	99
October 16	O. P. Hall	61	88	1.30	68

[a] All records of discharge at this station have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled, "Water powers of North Carolina."

Daily gage height, in feet, of Cheoah River at Millsaps, N. C., for 1907 and 1908.

[Observer, Miss Birdie Nickols.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	1.4	1.35	1.3	1.5	16	.....	1.15	1.3	1.5	1.7
2	.....	1.35	1.5	2.0	1.75	17	.....	1.1	1.25	1.5	2.0
3	.....	1.3	1.4	1.5	1.8	18	.....	1.1	1.3	1.75	1.9
4	.....	1.25	1.35	1.25	1.6	19	.....	1.1	1.25	1.5	1.8
5	.....	1.2	1.4	1.3	1.75	20	.....	1.1	1.3	1.6	1.75
6	.....	1.2	1.45	1.3	1.5	21	.....	1.9	1.25	1.5	1.55
7	.....	1.4	1.4	1.35	1.75	22	.....	1.5	1.2	1.55	1.75
8	.....	1.25	1.5	1.3	1.6	23	.....	4.1	1.25	3.0	1.85
9	.....	1.3	1.45	1.5	2.0	24	1.5	1.4	1.3	2.0	1.9
10	.....	1.2	1.4	2.3	1.5	25	1.5	1.3	1.25	1.5	1.8
11	.....	1.6	1.4	1.75	1.75	26	1.4	1.35	1.2	2.0	2.0
12	.....	1.3	1.45	1.5	1.85	27	1.3	1.75	1.5	1.7	2.1
13	.....	1.25	1.4	1.6	2.0	28	1.3	1.25	1.4	1.8	1.9
14	.....	1.15	1.45	1.5	1.75	29	1.3	1.30	1.3	1.5	1.9
15	.....	1.2	1.3	1.75	1.85	30	1.3	1.4	1.25	1.6	5.5
						31	1.2	.....	1.3	.....	3.8

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	2.5	2.0	2.0	2.0	2.0	1.5	16	2.25	3.0	2.0	1.45	2.0	1.45
2	2.25	2.0	2.0	2.0	2.0	1.5	17	2.75	3.0	2.0	1.5	2.0	1.4
3	2.0	2.5	2.1	2.0	2.0	2.0	18	2.5	2.5	1.9	1.5	2.0	1.4
4	2.0	2.0	2.2	1.95	2.0	1.5	19	2.75	2.75	2.0	1.5	3.0	1.4
5	3.5	2.0	2.1	1.9	2.5	1.5	20	2.6	2.6	2.0	1.5	2.5	1.4
6	2.75	1.9	2.0	1.9	2.0	1.5	21	2.65	2.2	2.5	2.0	2.0	1.4
7	2.25	2.0	1.9	1.95	2.0	1.5	22	2.2	2.1	2.0	2.0	2.0	1.4
8	2.5	2.1	2.0	1.95	2.0	1.5	23	2.15	1.9	2.0	2.0	2.0	1.4
9	2.9	2.15	2.0	1.95	2.0	1.5	24	2.1	2.1	3.0	1.9	2.5	1.35
10	2.7	2.0	2.0	1.9	2.0	2.5	25	2.0	2.0	2.5	3.0	2.0	1.3
11	2.9	2.0	1.9	1.9	2.0	2.0	26	2.0	2.0	2.3	2.5	2.0	1.3
12	2.8	2.5	2.0	1.5	2.5	1.5	27	2.0	2.0	2.0	2.4	1.5	1.3
13	2.85	2.75	2.0	1.5	2.4	1.5	28	2.9	2.1	2.0	2.0	1.5	1.3
14	2.7	2.9	2.0	1.4	2.45	1.5	29	2.8	2.2	2.1	2.0	1.5	1.3
15	2.6	6.0	1.9	1.45	2.0	1.45	30	2.7	.....	2.5	2.0	1.5	1.3
							31	2.5	.....	2.0	.....	1.5	.....

Daily discharge, in second-feet, of Cheoah River at Millsaps, N. C., for 1907 and 1908.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.						1907.					
1	.....	83	76	68	99	16	.....	47	68	99	132
2	.....	76	99	.....	.....	17	.....	40	61	99	.....
3	.....	68	83	99	.....	18	.....	40	68	.....	.....
4	.....	61	76	61	115	19	.....	40	61	99	.....
5	.....	54	83	68	.....	20	.....	40	68	115	.....
6	.....	54	91	68	99	21	.....	.....	61	99	107
7	.....	83	83	76	.....	22	.....	99	54	107	.....
8	.....	61	99	68	115	23	.....	.....	61	.....	.....
9	.....	68	91	99	.....	24	99	83	68	.....	.....
10	.....	54	83	.....	99	25	99	68	61	99	.....
11	.....	115	83	.....	.....	26	83	76	54	.....	.....
12	.....	68	91	99	.....	27	68	.....	99	132	.....
13	.....	61	83	115	.....	28	68	61	83	.....	.....
14	.....	47	91	99	.....	29	68	68	68	99	.....
15	.....	54	68	.....	.....	30	68	83	61	115	.....
						31	54	.....	68	.....	.....

(See note at foot of table on next page.)

Daily discharge, in second-feet, of Cheoah River at Millsaps, N. C., for 1907 and 1908—Continued.

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1908.				1908.			
1			99	16	91		91
2			99	17	99		83
3				18	99		83
4			99	19	99		83
5			99	20	99		83
6			99	21			83
7			99	22			83
8			99	23			83
9			99	24			76
10				25			68
11				26			68
12	99		99	27		99	68
13	99		99	28		99	68
14	83		99	29		99	68
15	91		91	30		99	68
				31		99	

NOTE.—Daily discharge for 1907 and 1908 based on an approximate rating curve. On missing days, from August 24, 1907, to June 30, 1908, the discharge was greater than 140 second-feet.

CLINCH RIVER AT CLINCHPORT, VA.

Clinch River rises in the Cumberland Mountains, in southern Virginia, and flows in a southwesterly direction, generally parallel to Holston River. It discharges into Tennessee River at Kingston, Tenn., 104 miles above Chattanooga, and 79 miles below Knoxville. The country drained by this river includes about 4,390 square miles, is mountainous, and has meager transportation facilities.

The gaging station is located in Clinchport at the railroad bridge about 400 feet east of the Virginia and Southwestern Railroad station. It was established June 7, 1907, in cooperation with the Forest Service, to obtain data for use in connection with studies of the water resources of the southern Appalachian Mountains. The station is a short distance below the mouth of Stock Creek and about 1½ miles above Copper Creek.

Discharge measurements are made from the railroad bridge, where the current is rather sluggish during low water, and the bed is probably slightly shifting.

Discharge measurements of Clinch River at Clinchport, Va., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage. height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 15	Warren E. Hall	202	918	1.30	757
Do	B. M. Hall, jr	202	910	1.30	734
September 7	do	207	810	.81	430
1908.					
February 24	Warren E. Hall	227	1,150	2.10	1,530
July 2	F. P. Thomas	229	971	1.14	664
Do	Warren E. Hall	229	971	1.14	655

Daily gage height, in feet, of Clinch River at Clinchport, Va., for 1907 and 1908.

[Observer, C. R. Lane.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	1.9	1.6	0.8	1.0	0.7	1.9
2	.....	.....	.....	.....	.....	.....	1.5	2.6	.9	.9	.9	1.7
3	.....	.....	.....	.....	.....	.....	1.3	1.6	1.2	.8	2.5	1.6
4	.....	.....	.....	.....	.....	.....	1.2	1.4	1.4	.8	1.9	1.5
5	.....	.....	.....	.....	.....	.....	1.1	1.1	1.0	.9	1.5	1.4
6	.....	.....	.....	.....	.....	.....	1.0	1.4	.9	1.0	1.3	1.3
7	.....	.....	.....	.....	.....	2.0	1.2	1.9	.8	1.0	1.2	1.2
8	.....	.....	.....	.....	.....	2.3	1.1	1.7	1.0	1.1	1.2	1.1
9	.....	.....	.....	.....	.....	7.2	1.0	1.7	.9	1.1	1.1	1.1
10	.....	.....	.....	.....	.....	4.6	1.0	2.0	.8	1.0	4.2	1.3
11	.....	.....	.....	.....	.....	4.8	1.1	1.5	1.6	.9	10.0	1.8
12	.....	.....	.....	.....	.....	8.5	1.2	1.3	1.4	.8	4.9	3.1
13	.....	.....	.....	.....	.....	5.6	1.6	1.2	1.3	.8	3.4	2.5
14	.....	.....	.....	.....	.....	18.8	2.2	1.8	1.2	.8	2.7	2.2
15	.....	.....	.....	.....	.....	10.0	2.0	1.4	1.0	.7	2.3	2.1
16	.....	.....	.....	.....	.....	5.6	1.6	1.2	.9	.7	1.9	2.3
17	.....	.....	.....	.....	.....	4.2	1.5	1.3	.8	.7	1.7	2.1
18	.....	.....	.....	.....	.....	3.3	1.3	2.7	.8	.6	1.8	2.0
19	.....	.....	.....	.....	.....	2.9	1.2	3.0	.7	.6	2.6	1.9
20	.....	.....	.....	.....	.....	2.6	1.1	2.2	.7	.6	2.9	1.7
21	.....	.....	.....	.....	.....	2.3	1.0	2.1	.7	.6	2.6	1.6
22	.....	.....	.....	.....	.....	2.2	.9	1.7	1.3	.6	2.3	1.5
23	.....	.....	.....	.....	.....	1.9	.8	1.6	2.1	.6	2.1	2.2
24	.....	.....	.....	.....	.....	1.9	.8	1.5	2.3	.6	8.0	3.7
25	.....	.....	.....	.....	.....	2.0	1.7	1.5	2.1	.6	6.5	3.4
26	.....	.....	.....	.....	.....	1.7	1.6	1.4	1.6	.5	4.5	2.8
27	.....	.....	.....	.....	.....	1.6	1.4	1.4	1.3	.6	3.5	2.4
28	.....	.....	.....	.....	.....	1.4	1.7	1.2	1.1	.7	2.9	2.2
29	.....	.....	.....	.....	.....	1.2	1.3	1.1	1.1	.6	2.5	2.0
30	.....	.....	.....	.....	.....	2.9	2.2	1.0	1.0	.6	2.1	4.5
31	.....	.....	.....	.....	.....	.....	1.9	.9	.....	.6	.....	7.3
1908.												
1	4.7	2.2	3.0	2.8	2.0	1.9	1.2	.8	.6	.5	1.4	1.4
2	3.7	2.9	4.3	11.3	1.9	1.5	1.2	.7	.6	.5	1.1	1.8
3	3.1	2.4	4.5	8.2	1.9	1.4	1.1	.6	.5	.5	1.0	1.8
4	2.6	2.2	3.8	5.6	1.9	1.3	1.0	.6	.5	.5	.8	1.4
5	3.3	2.3	3.4	4.2	1.8	1.6	1.0	.6	.6	.4	.8	1.4
6	4.0	3.5	6.6	3.5	1.9	2.5	1.0	.6	3.0	.4	.7	1.3
7	3.5	4.9	5.9	3.1	2.3	1.9	1.2	.8	3.7	.4	.7	2.5
8	3.1	4.2	4.4	2.7	3.1	1.6	1.6	.8	2.3	.4	.6	4.3
9	2.7	3.4	3.5	2.5	2.8	1.4	1.2	1.0	1.7	.4	.6	3.9
10	2.3	2.9	3.2	2.3	2.5	1.3	1.1	1.1	1.3	.7	.6	2.7
11	2.1	3.2	2.8	2.2	2.2	1.3	1.0	1.6	1.1	1.1	.7	2.2
12	3.9	3.7	3.4	2.3	2.0	1.2	.9	1.1	1.0	.8	1.5	3.3
13	7.4	5.2	3.9	2.5	1.8	1.1	.8	.9	.9	.7	1.7	3.4
14	4.9	5.5	3.7	2.3	1.7	1.0	.8	.8	.8	.6	1.4	2.9
15	3.7	6.9	3.4	2.2	1.5	1.1	1.6	.7	.8	.6	1.3	2.6
16	3.3	8.0	3.1	2.1	1.5	3.6	1.0	.8	.7	.6	1.2	2.2
17	2.9	5.4	2.9	2.0	1.4	2.5	1.2	.8	.7	.5	1.2	1.9
18	2.7	4.1	4.7	1.9	1.4	1.8	1.0	1.2	.7	.4	1.2	1.7
19	2.5	3.4	3.7	1.9	1.4	1.4	1.0	1.5	.6	.4	1.3	1.6
20	2.3	3.0	5.0	1.9	1.9	1.2	.9	1.2	.6	.4	1.3	1.6
21	2.2	2.7	4.9	1.8	3.2	1.6	.8	1.1	.6	.4	1.3	1.6
22	2.1	2.4	4.3	1.7	2.7	1.7	.7	1.9	.6	.4	1.2	1.7
23	2.1	2.2	4.2	1.6	2.4	7.7	.7	2.2	.6	.5	1.1	5.0
24	2.0	2.1	4.6	1.5	2.2	3.7	.6	1.7	.5	.7	1.0	4.2
25	1.9	2.0	4.9	1.7	2.1	2.8	.7	1.3	.5	1.0	1.0	3.4
26	1.8	2.2	4.1	4.2	2.0	2.1	.7	1.0	.5	.8	.9	3.7
27	2.3	2.8	3.4	3.6	1.9	1.7	.7	.9	.5	.7	.9	5.0
28	3.7	2.6	3.0	2.9	1.9	1.5	.7	.8	.5	.7	.8	3.6
29	3.1	2.4	2.7	2.4	2.0	1.3	.7	.8	.5	.9	.8	3.0
30	2.6	.....	2.6	2.1	2.9	1.3	1.1	.8	.5	1.1	.9	2.8
31	2.2	.....	2.4	.....	2.4	.....	1.0	.7	.....	1.3	.....	3.0

HIWASSEE RIVER DRAINAGE BASIN.

DESCRIPTION OF BASIN.

The Hiawassee, or, as it is more commonly written, Hiwassee River, rises in the mountains of the Blue Ridge, in western North Carolina and northern Georgia, whence, flowing in a northwesterly direction, it breaks through the Unaka Range, and enters Tennessee River 36 miles above Chattanooga and 148 miles below Knoxville. The Hiwassee receives the tributary waters of the Ocoee about 12 miles above Charleston and 6 miles below Savannah Ford or Farm, which is held to be the head of navigation.

Its drainage area, comprising about 2,700 square miles, is equivalent to the western slope of the mountainous divide between Little Tennessee and Hiwassee rivers, which divide is a cross range between the Blue Ridge and the Smoky Mountains. The altitude of this tract ranges between 1,500 and 5,000 feet. Spurs from 5 to 20 miles long reach from the divide toward the river, while deep valleys extend from the river far into the mountains.

The mountain sides are steep and in many places rocky, while the creek valleys, of which there are six prominent ones, have considerable areas of alluvial flats and rolling foothills.

Even the alluvial flats along the river and creeks have a large proportion of clay, and the foothills are almost entirely clay. The mountain sides are loamy, the coves are very fertile, the ridges light and often stony.

HIWASSEE RIVER NEAR HAYESVILLE, N. C.

This station is located at the iron wagon bridge known as Barnard Bridge, 2½ miles east of Hayesville. It was established May 20, 1907, in cooperation with the Forest Service and has been continued to supply general run-off and water-power data. The station is about 1 mile below the mouth of Shooting Creek and 4 miles above Tusquitee Creek, both of which are important tributaries.

The gage is a vertical rod attached to a maple tree on left bank, about 200 feet above the bridge.

Discharge measurements are made from the single span bridge where the current is swift and the bed is composed largely of rock and is permanent.[a]

Discharge measurements of Hiwassee River near Hayesville, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	F. A. Murray	89	136	1.41	437
August 22	F. P. Thomas	90	134	1.32	390
Do	F. A. Murray	88	132	1.32	382
October 14	O. P. Hall	89	131	1.00	242
1908.					
August 14	F. P. Thomas	78	98	0.88	198
November 20	M. R. Hall	84	120	1.01	237
Do	do	84	119	1.01	235

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Hiwassee River near Hayesville, N. C., for 1907 and 1908.

[Observer, Mrs. V. A. Barnard.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.4	1.3	1.25	1.0	1.3	0.9	1.25
2	.....	.....	.....	.....	.....	1.9	1.3	1.2	.9	1.2	1.4	1.2
3	.....	.....	.....	.....	.....	1.8	1.3	1.15	1.0	1.2	1 05	1.2
4	.....	.....	.....	.....	.....	1.7	1.7	1.1	1.1	1 2	1.05	1.2
5	.....	.....	.....	.....	.....	1.55	1.4	1.1	1.1	1.25	1.0	1.15
6	.....	.....	.....	.....	.....	1.45	1.3	1.1	1.0	1.15	1.1	1.15
7	.....	.....	.....	.....	.....	1.45	1.3	1.1	.95	1.1	1.0	1.15
8	.....	.....	.....	.....	.....	2.3	1.3	1.2	1.0	1.45	1.0	1.1
9	.....	.....	.....	.....	.....	1.9	1.3	1.1	1.0	1.15	.95	1.35
10	.....	.....	.....	.....	.....	1.8	1.25	1.1	1 3	1.1	1.5	2.5
11	.....	.....	.....	.....	.....	1.8	1.5	1.05	1.6	1.0	1.3	1.8
12	.....	.....	.....	.....	.....	1.55	1.6	1.3	1.15	1.0	1.2	1.55
13	.....	.....	.....	.....	.....	1.5	2.1	1.1	1.1	1.0	1.2	1.5
14	.....	.....	.....	.....	.....	1.8	1.5	1.35	1.0	1.0	1.1	2.5
15	.....	.....	.....	.....	.....	1.5	1.4	2.7	1.0	1.0	1.05	2.3
16	.....	.....	.....	.....	.....	1.45	1.5	1.5	.95	1.0	1.0	1.9
17	.....	.....	.....	.....	.....	1.4	1.4	1.3	.92	.95	1.0	1.8
18	.....	.....	.....	.....	.....	1.4	1.35	1.7	.92	.9	1.4	1.7
19	.....	.....	.....	.....	.....	1.4	1.4	1.45	.9	.9	1.2	1.6
20	.....	.....	.....	.....	1.4	1.4	1.4	1.3	.9	.9	1.15	1.5
21	.....	.....	.....	.....	1.4	1.4	1.35	1.35	.89	.9	1.9	1.4
22	.....	.....	.....	.....	1.4	1.35	1.3	1.35	1.05	.9	1.6	1.4
23	.....	.....	.....	.....	1.4	1.5	1.25	1.3	9.3	.9	2.1	2.9
24	.....	.....	.....	.....	1.4	1.6	1.2	1.35	2.1	1.0	2.9	2.2
25	.....	.....	.....	.....	1.4	1.55	1.2	1.2	1.5	.95	1.9	2.0
26	.....	.....	.....	.....	2.2	1.45	1.2	1.15	1.3	.9	1.6	1.9
27	.....	.....	.....	.....	1.55	1.40	1.15	1.1	1.2	1.4	1.5	1.8
28	.....	.....	.....	.....	1.4	1.40	1.15	1.05	1.8	1.1	1.4	1.7
29	.....	.....	.....	.....	1.4	1.50	1.1	1.05	1.8	1.0	1.3	1.6
30	.....	.....	.....	.....	1.4	1.40	2.1	1.00	1.5	.95	1.25	3.4
31	.....	.....	.....	.....	1.9	.....	1.3	1.00	.....	.9	.....	2.4
1908.												
1	2.10	2.40	1.70	1.95	2.00	1.45	1.05	.90	1.00	.80	1.20	1.50
2	1.90	1.90	1.70	1.90	1.90	1.40	1.00	.90	.95	.78	1.10	1.40
3	1.80	1.80	1.95	1.85	1.95	1.40	1.20	.90	.90	.76	1.05	1.20
4	1.70	1.75	1.90	1.80	1.80	1.50	1.20	.90	.90	.75	1.20	1.15
5	3.10	1.70	1.80	1.75	1.80	1.40	1.90	1.00	.95	.74	1.05	1.10
6	2.35	2.00	1.80	1.90	1.80	1.40	1.50	1.30	1.50	.74	1.05	1.10
7	2.25	1.80	1.75	1.80	2.50	1.35	1.50	1.10	1.20	.74	1.05	6.20
8	2.00	1.70	1.70	1.75	1.95	1.35	1.90	1.10	1.10	.72	1.00	2.60
9	1.80	1.65	1.70	1.70	1.90	1.30	2.20	1.40	1.05	.90	.98	1.90
10	1.70	2.20	1.65	1.70	1.85	1.30	1.70	1.05	1.00	1.50	.95	1.80
11	1.75	2.40	1.60	1.65	1.75	1.40	1.70	1.00	1.00	1.05	1.00	1.50
12	5.00	2.70	2.40	1.60	1.70	1.30	1.40	.95	1.00	.95	1.10	1.80
13	3.10	2.60	1.90	1.60	1.65	1.25	1.30	.90	.95	.85	1.05	1.55
14	2.50	2.50	1.85	1.55	1.60	1.60	1.25	.90	.90	.84	1.15	1.50
15	2.30	7.90	1.80	2.40	1.60	1.45	1.20	.90	.90	.82	1.15	1.40
16	2.10	3.80	1.75	2.20	1.55	1.30	1.30	.85	.85	.80	1.05	1.30
17	2.20	3.00	1.65	2.05	1.55	1.25	1.20	.85	.80	.80	1.05	1.30
18	2.05	2.60	1.60	1.95	1.60	1.30	1.15	.90	.80	.80	1.05	1.30
19	1.90	2.63	1.60	2.15	2.10	1.20	1.30	.85	.80	.80	.98	1.35
20	1.85	2.35	2.50	2.00	1.70	1.15	1.15	1.10	.80	.78	.97	1.30
21	1.80	2.20	2.60	1.90	1.60	1.25	1.10	.90	.80	.78	.97	1.25
22	1.80	2.05	2.20	1.80	1.55	1.30	1.05	1.50	.80	.76	.95	2.50
23	1.80	2.00	5.20	1.80	1.50	1.20	1.00	1.35	.80	2.00	.94	2.15
24	1.70	1.95	4.90	1.75	1.70	1.20	1.00	1.35	.80	1.50	.94	1.85
25	1.65	1.90	3.20	4.90	1.60	1.20	1.10	1.95	.80	1.20	.92	1.70
26	1.60	2.05	2.75	2.90	1.70	1.10	1.10	1.60	.80	1.10	.90	1.60
27	1.90	1.90	2.50	2.60	1.70	1.10	1.05	1.40	.80	1.00	.90	1.50
28	1.70	1.80	2.20	2.30	1.60	1.10	1.00	1.20	.95	1.10	.90	1.50
29	1.75	1.80	2.15	2.15	1.50	1.10	1.10	1.10	.85	2.10	.90	1.40
30	1.60	.....	2.05	2.15	1.60	1.05	1.05	1.10	.80	1.50	.88	1.40
31	1.50	.....	2.00	.....	1.50	.....	1.00	1.05	.....	1.35	.....	1.50

Daily discharge, in second-feet, of Hiwassee River near Hayesville, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	370	344	236	370	204	344
2	.....	.....	.....	.....	.....	.....	370	318	204	318	430	318
3	.....	.....	.....	.....	.....	.....	370	296	236	318	255	318
4	.....	.....	.....	.....	.....	.....	.....	274	274	318	255	318
5	.....	.....	.....	.....	.....	.....	430	274	274	344	236	296
6	.....	.....	.....	.....	.....	465	370	274	274	296	274	296
7	.....	.....	.....	.....	.....	465	370	274	220	274	236	296
8	.....	.....	.....	.....	.....	.....	370	318	236	465	236	274
9	.....	.....	.....	.....	.....	.....	370	274	236	296	220	400
10	.....	.....	.....	.....	.....	.....	344	274	370	274	500	.....
11	.....	.....	.....	.....	.....	.....	500	255	.....	236	370	.....
12	.....	.....	.....	.....	.....	.....	.....	370	296	236	318	.....
13	.....	.....	.....	.....	.....	500	.....	274	274	236	318	500
14	.....	.....	.....	.....	.....	.....	500	400	236	236	274	.....
15	.....	.....	.....	.....	.....	500	430	.....	236	236	255	.....
16	.....	.....	.....	.....	.....	465	500	500	220	236	236	.....
17	.....	.....	.....	.....	.....	430	430	370	210	220	236	.....
18	.....	.....	.....	.....	.....	430	400	.....	210	204	430	.....
19	.....	.....	.....	.....	.....	430	430	465	204	204	318	.....
20	.....	.....	.....	.....	430	430	430	370	204	204	296	500
21	.....	.....	.....	.....	430	430	400	400	201	204	.....	430
22	.....	.....	.....	.....	430	400	370	400	255	204	.....	430
23	.....	.....	.....	.....	430	500	344	370	.....	204	.....	.....
24	.....	.....	.....	.....	430	.....	318	400	.....	236	.....	.....
25	.....	.....	.....	.....	430	.....	318	318	500	220	.....	.....
26	.....	.....	.....	.....	.....	465	318	296	370	204	.....	.....
27	.....	.....	.....	.....	.....	430	296	274	318	430	500	.....
28	.....	.....	.....	.....	430	430	296	255	.....	274	430	.....
29	.....	.....	.....	.....	430	500	274	255	.....	236	370	.....
30	.....	.....	.....	.....	430	430	.....	236	500	220	344	.....
31	.....	.....	.....	.....	.....	.....	370	236	.....	204	.....	.....
1908.												
1	.....	.....	.....	.....	.....	465	255	204	236	176	318	500
2	.....	.....	.....	.....	.....	430	236	204	220	171	274	430
3	.....	.....	.....	.....	.....	430	318	204	204	166	255	318
4	.....	.....	.....	.....	.....	500	318	204	204	164	318	296
5	.....	.....	.....	.....	.....	430	.....	236	220	162	255	274
6	.....	.....	.....	.....	.....	430	500	370	500	162	255	274
7	.....	.....	.....	.....	.....	400	500	274	318	162	255	.....
8	.....	.....	.....	.....	.....	400	.....	274	274	157	236	.....
9	.....	.....	.....	.....	.....	370	.....	430	255	204	230	.....
10	.....	.....	.....	.....	.....	370	.....	255	236	500	220	.....
11	.....	.....	.....	.....	.....	430	.....	274	236	255	236	500
12	.....	.....	.....	.....	.....	370	430	220	236	220	274	.....
13	.....	.....	.....	.....	.....	344	370	204	220	190	255	.....
14	.....	.....	.....	.....	.....	.....	344	204	204	187	296	500
15	.....	.....	.....	.....	.....	465	318	204	204	182	296	430
16	.....	.....	.....	.....	.....	370	370	190	190	176	255	370
17	.....	.....	.....	.....	.....	344	318	190	176	176	255	370
18	.....	.....	.....	.....	.....	370	296	204	176	176	255	370
19	.....	.....	.....	.....	.....	318	370	190	176	176	230	400
20	.....	.....	.....	.....	.....	296	296	274	176	171	226	370
21	.....	.....	.....	.....	.....	344	274	204	176	171	226	344
22	.....	.....	.....	.....	.....	370	255	500	176	166	220	.....
23	.....	.....	.....	.....	500	318	236	400	176	.....	217	.....
24	.....	.....	.....	.....	.....	318	236	400	176	500	217	.....
25	.....	.....	.....	.....	.....	318	274	.....	176	318	210	.....
26	.....	.....	.....	.....	.....	274	274	.....	176	274	204	.....
27	.....	.....	.....	.....	.....	274	255	430	176	236	204	500
28	.....	.....	.....	.....	.....	274	236	318	220	274	204	500
29	.....	.....	.....	.....	500	255	274	274	190	.....	204	430
30	.....	.....	.....	.....	.....	.....	255	274	176	500	198	430
31	500	.....	.....	.....	500	.....	236	255	.....	400	.....	500

NOTE.—Daily discharge for 1907 and 1908 based on a well-defined rating curve. On missing days, beginning May 20, 1907, the discharge was greater than 530 second-feet.

HIWASSEE RIVER AT MURPHY, N. C.

This station is located at the highway bridge in Murphy, N. C., about 80 feet above the Louisville and Nashville Railroad bridge. The station was established July 26, 1896, and the record is continuous except for a short period from August 8 to October 19, 1897. There has been no change in gage datum since October 20, 1897, but prior to 1903 a wire gage was used which was broken a number of times, introducing uncertainty in the gage height records. The first gage was different.

The records are very valuable for water power estimates as well as other run-off problems.

The station is one-half mile above the mouth of Valley River. Backwater from Valley River is not apt to disturb the rating, though such an effect is possible.

At the measuring section the current is good and fairly regular, but the bed, which is rock, is uneven, requiring careful work in making soundings.[a]

Discharge measurements of Hiwassee River at Murphy, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 21	F. A. Murray	169	413	5.72	804
August 23	do	168	454	5.98	963
October 12	O. P. Hall	165	370	5.38	507
1908.					
April 15	M. R. Hall	174	627	6.96	2,250
April 17	do	172	560	6.57	1,670
August 15	F. P. Thomas	160	324	5.16	375
November 19 [b]	M. R. Hall	168	404	5.92	415
November 20 [b]	do	168	403	5.90	408

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

[b] Discharge measurements affected by fish-trap dam below the station; reduction in discharge from this cause over 50 per cent at a stage of 5.9 feet.

Daily gage height, in feet, of Hiwassee River at Murphy, N. C., for 1907 and 1908.

[Observer, William Mingus.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	6.9	6.35	6.25	6.05	5.95	6.75	5.65	5.6	5.35	5.85	5.3	5.65
2	6.75	7.3	8.3	5.75	5.9	6.6	5.65	5.55	5.3	5.7	5.35	5.6
3	6.6	6.6	7.1	5.7	5.85	6.3	5.6	5.45	5.35	5.6	5.7	5.55
4	6.45	6.4	6.6	5.7	6.3	6.1	6.05	5.45	5.45	5.55	5.45	5.5
5	6.35	7.6	6.4	5.65	5.85	6.0	5.6	5.4	5.7	5.65	5.4	5.45
6	6.25	6.9	6.25	6.0	5.8	5.75	5.55	5.45	5.3	5.5	5.4	5.45
7	6.2	6.55	6.15	5.9	6.25	5.75	5.5	5.45	5.3	5.45	5.4	5.45
8	6.15	6.35	6.25	5.95	6.1	5.8	5.45	5.4	5.3	5.6	5.35	5.45
9	6.1	6.25	6.1	5.85	6.0	6.4	5.4	5.4	5.7	5.5	5.35	5.45
10	6.1	6.15	6.25	5.85	5.95	6.2	5.4	5.35	6.4	5.45	5.65	6.7
11	6.05	6.1	6.25	5.75	6.4	6.0	5.75	5.35	6.55	5.4	5.95	6.1
12	6.05	6.05	6.15	5.85	5.85	5.9	5.85	6.05	5.5	5.4	5.7	5.9
13	6.0	6.0	6.1	5.85	5.8	5.8	7.25	5.70	5.4	5.35	5.6	5.8
14	5.95	5.95	6.05	5.75	6.05	6.25	5.9	5.60	5.35	5.35	5.5	6.8
15	5.95	5.9	6.2	5.7	6.05	5.85	5.75	6.60	5.3	5.3	5.5	6.35
16	5.95	5.85	6.05	5.85	5.95	5.75	5.9	6.05	5.3	5.35	5.45	6.1
17	5.9	5.85	6.0	5.85	5.9	5.7	5.7	5.85	5.3	5.3	5.45	5.95
18	5.9	5.85	6.0	5.8	5.85	5.95	5.7	5.9	5.3	5.3	5.65	5.9
19	5.85	5.8	5.95	6.2	5.8	5.75	6.05	6.05	5.25	5.3	5.6	5.8
20	6.0	5.85	5.9	5.95	5.75	5.7	5.8	5.75	5.25	5.3	5.6	5.7
21	5.9	5.8	5.85	5.85	5.75	5.65	5.6	6.35	5.25	5.3	5.85	5.75
22	5.85	5.75	5.85	5.8	5.75	5.7	5.55	6.5	5.3	5.25	5.9	5.65
23	5.85	5.75	5.8	7.2	5.65	6.05	5.5	6.1	11.4	5.3	6.6	7.0
24	5.85	5.75	5.8	6.65	5.65	6.0	5.45	5.9	6.85	5.3	7.4	6.5
25	5.8	6.15	5.75	6.3	5.75	6.45	5.4	5.8	5.95	5.3	6.5	6.35
26	5.85	5.9	5.8	6.15	5.95	5.8	5.45	5.6	5.7	5.25	6.15	6.05
27	5.8	6.45	5.75	6.45	6.05	5.75	5.5	5.5	5.6	5.3	5.9	5.95
28	5.8	6.15	5.7	6.05	5.8	5.7	5.6	5.45	5.65	5.7	5.85	5.95
29	5.75	.....	5.7	6.0	5.7	6.05	5.4	5.4	6.8	5.35	5.75	5.9
30	5.75	.....	5.7	6.0	5.65	5.75	8.7	5.4	6.1	5.3	5.7	6.95
31	5.75	.....	5.7	.....	6.05	.....	5.85	5.35	.....	5.3	.....	7.0
1908.												
1	6.55	7.3	6.2	6.4	6.45	5.8	5.25	5.2	5.25	5.0	[a] 6.0	[a] 6.3
2	6.35	6.55	6.1	6.3	6.3	5.7	5.3	5.15	5.2	5.0	[a] 5.95	[a] 6.4
3	6.15	6.35	6.4	6.2	6.25	5.65	5.45	5.1	5.2	5.0	[a] 5.9	[a] 6.1
4	6.05	6.3	6.3	6.3	6.15	5.85	5.5	5.2	5.15	4.95	[a] 6.25	[a] 6.0
5	6.9	6.25	6.2	6.2	6.1	5.75	6.45	5.3	5.2	5.0	[a] 6.0	[a] 6.0
6	8.0	6.55	6.2	6.4	6.15	6.0	5.8	5.6	6.2	5.0	[a] 5.9	[a] 6.0
7	6.7	6.3	6.1	6.2	7.7	5.7	5.9	5.5	5.5	4.95	[a] 5.9	9.9
8	6.45	6.2	6.1	6.1	6.6	5.65	6.1	5.45	5.35	5.0	[a] 5.9	7.2
9	6.25	6.2	6.05	6.0	6.4	5.6	6.8	6.0	5.3	5.2	[a] 5.85	6.55
10	6.15	6.25	6.1	6.1	6.25	5.6	6.25	5.4	5.25	6.35	[a] 5.85	6.2
11	6.1	6.9	6.1	6.0	6.15	5.85	6.2	5.25	5.2	5.35	[a] 6.0	6.0
12	9.2	6.95	7.2	6.9	6.1	5.6	5.75	5.2	5.2	5.2	[a] 6.1	6.6
13	7.0	6.95	6.6	6.0	6.0	5.5	5.6	5.15	5.15	[a] 5.2	[a] 5.9	6.2
14	6.75	6.95	6.4	5.9	5.95	6.25	5.55	5.2	5.15	[a] 5.3	[a] 6.0	6.0
15	6.65	10.6	6.3	6.1	5.9	5.85	5.5	5.1	5.1	[a] 5.35	[a] 6.2	5.9
16	6.6	8.1	6.2	6.7	5.95	5.6	5.7	5.15	5.1	[a] 5.3	[a] 6.0	5.85
17	6.65	6.85	6.1	6.6	5.9	5.55	5.4	5.1	5.1	[a] 5.4	[a] 6.0	5.75
18	6.55	6.3	6.1	6.3	5.85	5.5	5.35	5.15	5.1	[a] 5.4	[a] 5.9	5.75
19	6.45	6.85	6.0	6.7	6.35	5.55	5.75	5.15	5.05	[a] 5.4	[a] 5.9	5.75
20	6.3	6.6	7.0	6.5	6.1	5.5	5.4	5.5	5.1	[a] 5.4	[a] 5.9	5.7
21	6.3	6.5	7.4	6.3	5.9	5.5	5.35	5.2	5.1	[a] 5.45	[a] 5.9	5.7
22	6.25	6.4	6.8	6.2	5.85	5.6	5.3	6.3	5.05	[a] 5.45	[a] 5.8	6.45
23	6.15	6.35	7.4	6.15	5.8	5.45	5.25	5.7	5.1	[a] 6.35	[a] 5.8	6.85
24	6.05	6.3	9.9	6.05	6.25	5.4	5.3	6.0	5.05	[a] 6.4	[a] 5.8	6.45
25	6.05	6.2	8.0	8.1	6.0	5.45	5.25	6.85	5.0	[a] 5.9	[a] 5.8	6.25
26	6.1	6.5	7.3	7.6	6.2	5.4	5.2	5.9	5.0	[a] 5.85	[a] 5.85	6.1
27	6.7	6.3	7.0	7.1	6.1	5.35	5.25	5.25	5.0	[a] 5.75	[a] 5.8	6.0
28	6.5	6.2	6.8	6.7	5.9	5.3	5.2	5.5	5.0	[a] 5.9	[a] 5.8	5.9
29	6.1	6.1	6.7	6.5	5.85	5.35	5.45	5.4	5.2	[a] 5.6	[a] 5.8	6.0
30	6.0	.....	6.5	6.4	6.2	5.3	5.3	5.3	5.15	[a] 6.3	[a] 5.7	5.85
31	6.0	.....	6.4	.....	6.9	.....	5.2	5.3	.....	[a] 6.1	.....	6.15

[a] Gage heights October 13 to December 6, 1908, affected by backwater from temporary fish-trap dam about 200 feet below the station. See discharge measurements November 19 and 20, 1908.

Rating table for Hiwassee River at Murphy, N. C., for 1907 and 1908

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
4.90	235	6.10	1,125	7.30	2,830	9.00	6,520
5.00	285	6.20	1,230	7.40	3,030	9.20	6,960
5.10	340	6.30	1,340	7.50	3,230	9.40	7,400
5.20	400	6.40	1,455	7.60	3,440	9.60	7,840
5.30	465	6.50	1,575	7.70	3,660	9.80	8,280
5.40	530	6.60	1,705	7.80	3,880	10.00	8,720
5.50	600	6.70	1,840	7.90	4,100	10.20	9,160
5.60	675	6.80	1,980	8.00	4,320	10.40	9,600
5.70	755	6.90	2,130	8.20	4,760	10.60	10,040
5.80	840	7.00	2,290	8.40	5,200	10.80	10,480
5.90	930	7.10	2,460	8.60	5,640	11.00	10,920
6.00	1,025	7.20	2,640	8.80	6,080		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on six discharge measurements made during 1907 and 1908 and is well defined below gage height 7.0 feet. Above gage height 7.6 feet the rating curve is a tangent, the difference being 220 per tenth.

This table supersedes the rating table used for 1907 in the Water powers of North Carolina : Bull. North Carolina Geol. Survey (in press)

Monthly discharge of Hiwassee River at Murphy, N. C., for 1907 and 1908.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,130	798	1,090	2.66	3.07	A.
February	3,440	798	1,290	3.15	3.28	A.
March	4,980	755	1,220	2.98	3.44	A.
April	2,640	715	1,030	2.51	2.80	A.
May	1,460	715	945	2.30	2.65	A.
June	1,910	715	1,020	2.49	2.78	A.
July	5,860	530	947	2.31	2.66	A.
August	1,700	498	787	1.92	2.21	A.
September	11,800	432	1,110	2.71	3.02	A.
October	885	432	546	1.33	1.53	A.
November	3,030	465	835	2.04	2.28	A.
December	2,290	565	1,080	2.63	3.03	A.
The year	11,800	432	992	2.42	32.75	
1908.						
January	6,960	1,020	1,720	4.20	4.84	A.
February	10,000	1,120	2,000	4.88	5.26	A.
March	8,500	1,020	1,930	4.71	5.43	A.
April	4,540	930	1,570	3.83	4.27	A.
May	3,660	840	1,250	3.05	3.52	A.
June	1,280	465	690	1.68	1.87	A.
July	1,980	400	701	1.71	1.97	A.
August	2,060	340	592	1.44	1.66	A.
September	1,230	285	400	.976	1.09	A.
October	1,400	260	433	1.06	1.22	C.
November	840	285	433	1.06	1.18	C.
December	8,500	498	1,330	3.24	3.74	A.
The year	10,000	260	1,090	2.65	36.05	

NOTE.—The above monthly discharge for 1907 supersedes the corresponding table given in Water powers of North Carolina: Bull. North Carolina Geol. Survey (in press).

Discharge October 13 to December 6, 1908, corrected on the basis of two discharge measurements and a comparison of gage heights with those recorded at Hayesville.

HIWASSEE RIVER AT RELIANCE, TENN.

This station is located at the Louisville and Nashville Railroad bridge at Reliance, Tenn. It is 2 miles above Spring Creek and 1 mile below Lost Creek. It was established August 17, 1900, to obtain water power and general run-off data. The water-power possibilities between Reliance and Murphy, N. C., are very great.

At ordinary stages the section is a fairly good one. The water is held back by a ledge of rock below and is rather sluggish at low stages. At one end of this ledge is a small corn mill, but it does not appear probable that the use of water power by this mill could affect the gage readings.

There has been no change in the gage datum.[a]

Discharge measurements of Hiwassee River at Reliance, Tenn., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 29	F. A. Murray	329	1,980	1.82	2,140
October 9	O. P. Hall	312	1,880	1.58	1,680
1908.					
December 19	M. R. Hall	310	2,000	1.60	1,630

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for 1907 and 1908.

[Observer, C. V. Higdon.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.7	2.3	2.5	2.3	2.05	3.15	1.85	1.75	1.3	1.9	1.3	1.8
2	3.2	4.6	3.0	2.0	2.0	2.9	1.8	1.6	1.35	1.7	1.35	1.7
3	2.9	3.2	3.6	1.9	1.95	2.5	1.75	1.55	1.3	1.65	1.25	1.65
4	2.8	2.75	2.9	1.95	2.05	2.3	1.8	1.45	1.4	1.65	1.55	1.65
5	2.6	4.0	2.65	1.85	2.0	2.15	1.85	1.45	1.4	1.6	1.4	1.6
6	2.6	3.3	2.5	2.1	2.05	2.0	1.7	1.5	1.3	1.6	1.3	1.6
7	2.45	2.8	2.4	2.2	2.25	1.9	1.6	1.55	1.25	1.5	1.35	1.55
8	2.4	2.6	2.5	2.0	2.6	2.05	1.5	1.5	1.25	1.5	1.4	1.55
9	2.35	2.55	2.55	2.05	2.2	3.1	1.5	1.5	1.3	1.6	1.35	1.5
10	2.3	2.4	2.35	2.0	2.0	2.3	1.5	1.4	1.4	1.6	1.6	2.6
11	2.25	2.35	2.65	1.9	2.7	2.2	1.4	1.35	1.75	1.4	2.4	2.4
12	2.25	2.25	2.4	1.85	2.7	2.1	1.7	1.35	1.4	1.4	1.85	2.05
13	2.2	2.2	2.35	2.0	2.3	1.9	3.1	1.55	1.35	1.3	1.7	1.9
14	2.15	2.15	2.35	1.9	2.15	2.2	2.3	1.5	1.35	1.35	1.6	2.15
15	2.1	2.15	2.6	1.8	2.1	2.0	2.0	1.7	1.2	1.35	1.55	2.7
16	2.1	2.05	2.35	1.85	2.5	1.9	1.9	2.7	1.2	1.35	1.55	2.4
17	2.1	2.05	2.25	2.05	2.15	1.8	1.85	1.8	1.2	1.35	1.45	2.15
18	2.1	2.0	2.2	1.95	2.1	1.8	1.75	2.0	1.2	1.3	1.4	2.05
19	2.05	2.0	2.15	2.15	1.95	1.9	1.85	2.4	1.2	1.3	1.75	2.0
20	2.15	2.1	2.1	2.35	2.0	1.8	1.8	1.8	1.15	1.3	1.6	1.9
21	2.4	2.0	2.05	2.05	1.9	1.85	1.7	1.6	1.15	1.25	1.85	1.85
22	2.05	2.0	2.0	2.0	1.8	1.85	1.55	1.7	1.15	1.3	2.0	2.05
23	2.00	2.05	2.0	2.15	1.8	1.85	1.5	2.0	3.0	1.3	1.8	2.35
24	2.0	2.0	1.95	2.95	1.8	2.0	1.5	2.0	3.1	1.3	4.4	2.7
25	2.0	2.1	1.95	2.50	1.85	2.05	1.45	1.8	2.0	1.35	3.0	2.4
26	2.0	2.15	2.0	2.3	2.0	2.1	1.5	1.6	1.7	1.3	2.5	2.25
27	2.0	2.8	1.95	2.25	2.7	2.05	1.5	1.5	1.55	1.35	2.2	2.15
28	1.95	2.4	1.9	2.2	2.0	1.95	1.5	1.4	1.7	1.65	2.0	2.05
29	1.9	.....	1.9	2.1	1.85	1.8	1.5	1.45	1.75	1.35	1.9	2.05
30	1.9	.....	1.85	2.1	1.8	2.0	3.9	1.5	2.25	1.25	1.85	2.6
31	1.9	.....	1.95	.....	1.9	.....	2.1	1.35	.....	1.25	.....	3.8

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Hiwassee River at Reliance, Tenn., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	3.9	2.95	2.3	2.45	2.55	1.85	1.35	1.3	1.25	1.05	1.4	4.0
2	2.6	2.95	2.3	2.4	2.35	1.75	1.3	1.25	1.25	1.0	1.2	2.15
3	2.4	2.4	2.5	2.35	2.25	1.75	1.4	1.2	1.2	1.0	1.25	1.7
4	2.4	2.35	2.4	2.25	2.2	2.45	2.1	1.2	1.2	1.0	1.25	1.45
5	4.4	2.25	2.4	2.3	2.25	2.5	2.55	1.5	1.25	1.0	1.45	1.4
6	3.2	2.3	2.35	2.45	2.3	2.1	2.1	1.55	2.5	1.0	1.3	1.4
7	2.9	2.3	2.3	2.4	2.5	2.0	1.95	1.8	1.8	1.0	1.25	4.5
8	2.75	2.2	2.25	2.25	2.8	1.8	2.0	1.6	1.45	1.0	1.2	4.2
9	2.5	2.15	2.2	2.2	2.5	1.75	1.9	1.65	1.3	1.05	1.2	2.7
10	2.35	2.25	2.2	2.15	2.35	1.7	2.2	1.75	1.25	1.35	1.15	2.2
11	2.25	2.95	2.15	2.1	2.25	1.75	2.1	1.4	1.2	1.65	1.2	2.0
12	5.4	2.6	3.1	2.1	2.3	1.8	1.9	1.3	1.2	1.25	1.3	2.15
13	3.9	2.7	2.95	2.05	2.1	1.65	1.7	1.3	1.2	1.15	1.3	2.25
14	3.2	2.85	2.65	2.0	2.05	1.8	1.65	1.25	1.15	1.15	1.25	2.0
15	2.8	4.2	2.5	2.1	2.0	2.05	1.55	1.25	1.15	1.15	1.35	1.85
16	2.7	4.7	2.4	3.0	2.0	1.8	1.5	1.2	1.15	1.1	1.4	1.75
17	2.9	3.6	2.35	2.55	2.0	1.65	1.6	1.2	1.15	1.05	1.3	1.7
18	2.65	3.0	2.25	2.5	2.0	1.6	1.45	1.15	1.1	1.05	1.2	1.65
19	2.55	2.85	2.25	3.0	2.4	1.6	1.6	1.2	1.1	1.05	1.15	1.65
20	2.4	2.85	2.35	2.7	2.2	1.6	1.6	1.5	1.1	1.0	1.15	1.65
21	2.35	2.6	3.6	2.5	2.05	1.6	1.4	1.4	1.05	1.05	1.15	1.6
22	2.3	2.5	2.9	2.35	1.95	1.6	1.4	1.8	1.05	1.05	1.2	2.45
23	2.25	2.4	2.4	2.25	1.9	1.6	1.3	2.2	1.05	1.05	1.15	3.4
24	2.15	2.3	7.7	2.2	1.95	1.5	1.55	1.8	1.05	2.25	1.15	2.55
25	2.05	2.5	4.3	2.4	1.95	1.5	1.45	1.95	1.05	1.55	1.15	2.25
26	2.05	2.5	3.5	4.0	2.0	1.45	1.3	1.8	1.05	1.3	1.15	2.1
27	2.2	2.5	3.1	3.0	1.95	1.4	1.3	1.75	1.0	1.2	1.2	1.95
28	2.25	2.4	2.9	2.55	1.9	1.4	1.25	1.6	1.05	1.25	1.15	1.9
29	2.2	2.3	2.7	2.25	2.0	1.35	1.35	1.35	1.05	1.35	1.1	2.0
30	2.1	.....	2.65	2.45	1.9	1.35	1.7	1.35	1.0	2.05	1.15	1.95
31	2.05	.....	2.5	.....	2.0	.....	1.35	1.35	.....	1.75	.....	2.05

Rating tables for Hiwassee River at Reliance, Tenn.

FOR 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.10	930	2.30	3,350	3.50	7,300	5.40	15,010
1.20	1,070	2.40	3,630	3.60	7,690	5.60	15,830
1.30	1,220	2.50	3,920	3.70	8,080	5.80	16,650
1.40	1,380	2.60	4,210	3.80	8,475	6.00	17,470
1.50	1,550	2.70	4,510	3.90	8,875	6.20	18,290
1.60	1,730	2.80	4,820	4.00	9,280	6.40	19,110
1.70	1,920	2.90	5,140	4.20	10,090	6.60	19,930
1.80	2,120	3.00	5,470	4.40	10,910	6.80	20,750
1.90	2,340	3.10	5,820	4.60	11,730	7.00	21,570
2.00	2,570	3.20	6,180	4.80	12,550	8.00	25,670
2.10	2,820	3.30	6,550	5.00	13,370		
2.20	3,080	3.40	6,920	5.20	14,190		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon three discharge measurements made during 1907 and the form of the 1904-6 curve and is well defined. Above gage height 3.5 feet the table is the same as the 1906 table. Above gage height 4.2 feet the rating curve is a tangent, the difference being 410 per tenth.

FOR 1908.

1.00	690	1.70	1,830	2.40	3,550	3.10	5,805
1.10	820	1.80	2,040	2.50	3,840	3.20	6,170
1.20	960	1.90	2,260	2.60	4,140	3.30	6,540
1.30	1,110	2.00	2,495	2.70	4,450	3.40	6,915
1.40	1,270	2.10	2,740	2.80	4,770	3.50	7,300
1.50	1,445	2.20	3,000	2.90	5,100		
1.60	1,630	2.30	3,270	3.00	5,445		

NOTE.—The above table is applicable only for open-channel conditions. It is based upon one discharge measurement made during 1908, earlier high water measurements and the form of previous curves, and is fairly well defined below gage height 2.3 feet. Above gage height 3.5 feet the table is the same as the 1907 table.

Monthly discharge of Hiwassee River at Reliance, Tenn., for 1907 and 1908.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum	Minimum.	Mean.	Per square mile.		
1907.						
January	8,080	2,340	3,390	2.87	3.31	A.
February	11,700	2,570	4,000	3.39	3.53	A.
March	7,690	2,230	3,470	2.94	3.39	A.
April	5,300	2,120	2,830	2.40	2.68	A.
May	4,510	2,120	2,870	2.43	2.80	A.
June	6,000	2,120	2,920	2.47	2.76	A.
July	8,880	1,380	2,290	1.94	2.24	A.
August	4,510	1,300	1,890	1.60	1.84	A.
September	5,820	1,000	1,740	1.47	1.64	A.
October	2,340	1,140	1,440	1.22	1.41	A.
November	10,900	1,140	2,350	1.99	2.22	A.
December	8,480	1,550	2,950	2.50	2.88	A.
The year	11,700	1,000	2,680	2.27	30.70	
1908.						
January	15,000	2,620	4,710	3.99	4.60	A.
February	12,100	2,870	4,600	3.90	4.21	A.
March	24,400	2,870	4,970	4.21	4.85	A.
April	9,280	2,500	3,740	3.17	3.54	A.
May	4,770	2,260	2,920	2.47	2.85	A.
June	3,840	1,190	1,920	1.63	1.82	A.
July	3,990	1,040	1,770	1.50	1.73	A.
August	3,000	890	1,450	1.23	1.42	A.
September	3,840	690	1,020	.864	.96	B.
October	3,140	690	1,050	.890	1.03	B.
November	1,360	820	1,000	.847	.94	B.
December	11,300	1,270	3,330	2.82	3.25	A.
The year	24,400	690	2,710	2.29	31.20	

TUSQUITEE CREEK NEAR HAYESVILLE, N. C.

This station was established on May 20, 1907, in cooperation with the Forest Service. It is at the wagon bridge about 3 miles northeast of Hayesville and 2½ miles above the mouth of the creek, which is a tributary to Hiwassee River.

Discharge measurements are made from the wooden wagon bridge where the current is somewhat rough and the bottom of the stream is rocky and not liable to change.[a]

Discharge measurements of Tusquitee Creek near Hayesville, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 20	F. A. Murray	34	66	1.50	114
August 21	F. P. Thomas	37	70	1.73	151
Do	F. A. Murray	35	65	1.72	144
October 14	O. P. Hall	27	49	1.22	55
1908.					
August 14	F. P. Thomas	30	30	0.98	36
Do	do	30	30	.98	36
November 20	M. R. Hall	25	46	1.10	39
Do	do	25	47	1.10	39

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Tusquitee Creek near Hayesville, N. C., for 1907 and 1908.

[Observer, T. C. Moore.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.0	1.4	1.5	1.3	1.6	1.2	1.45
2	.....	.....	.....	.....	.....	2.5	1.4	1.4	1.3	1.5	1.95	1.4
3	.....	.....	.....	.....	.....	2.0	1.4	1.4	1.35	1.45	1.5	1.4
4	.....	.....	.....	.....	.....	1.85	1.35	1.3	1.35	1.45	1.4	1.35
5	.....	.....	.....	.....	.....	1.8	1.3	1.3	1.3	1.5	1.35	1.35
6	.....	.....	.....	.....	.....	1.7	1.35	1.5	1.25	1.4	1.35	1.35
7	.....	.....	.....	.....	.....	1.7	1.3	1.3	1.25	1.4	1.3	1.35
8	.....	.....	.....	.....	.....	2.0	1.3	1.3	1.25	1.4	1.3	1.35
9	.....	.....	.....	.....	.....	1.8	1.35	1.3	1.3	1.35	1.25	1.4
10	.....	.....	.....	.....	.....	1.7	1.3	1.3	1.65	1.3	2.25	2.9
11	.....	.....	.....	.....	.....	1.7	1.4	1.25	1.4	1.3	1.7	2.1
12	.....	.....	.....	.....	.....	1.65	1.5	1.4	1.25	1.25	1.6	1.8
13	.....	.....	.....	.....	.....	1.6	2.0	1.3	1.2	1.25	1.5	1.5
14	.....	.....	.....	.....	.....	1.6	1.5	1.4	1.2	1.25	1.45	1.6
15	.....	.....	.....	.....	.....	1.5	1.5	1.3	1.2	1.2	1.4	1.6
16	.....	.....	.....	.....	.....	1.5	1.5	1.8	1.2	1.2	1.35	1.6
17	.....	.....	.....	.....	.....	1.5	1.5	1.6	1.2	1.2	1.35	1.55
18	.....	.....	.....	.....	.....	1.5	1.45	2.1	1.2	1.2	1.65	1.5
19	.....	.....	.....	.....	.....	1.5	1.6	1.7	1.2	1.2	1.45	1.5
20	.....	.....	.....	.....	1.5	1.55	1.55	1.6	1.15	1.15	1.4	1.5
21	.....	.....	.....	.....	1.5	1.5	1.4	1.8	1.15	1.15	1.5	1.45
22	.....	.....	.....	.....	1.5	1.5	1.4	2.0	2.85	1.15	1.7	1.45
23	.....	.....	.....	.....	1.4	1.4	1.4	1.85	2.4	1.2	1.9	1.7
24	.....	.....	.....	.....	1.4	1.45	1.35	1.75	1.55	1.2	2.2	1.7
25	.....	.....	.....	.....	1.5	1.45	1.3	1.7	1.4	1.2	1.9	1.65
26	.....	.....	.....	.....	2.6	1.55	1.3	1.6	1.35	1.2	1.8	1.6
27	.....	.....	.....	.....	1.85	1.4	1.35	1.5	1.3	1.55	1.7	1.6
28	.....	.....	.....	.....	1.7	1.4	1.35	1.5	2.5	1.35	1.6	1.7
29	.....	.....	.....	.....	1.6	1.5	3.4	1.4	2.1	1.3	1.55	1.6
30	.....	.....	.....	.....	1.65	1.45	2.0	1.35	1.75	1.25	1.5	3.0
31	.....	.....	.....	.....	2.4	.....	1.6	1.3	.....	1.2	.....	2.2
1908.												
1	2.0	1.85	1.6	1.8	1.8	1.75	1.25	1.15	1.25	1.1	1.1	2.0
2	1.85	1.75	1.8	1.75	1.75	1.65	1.7	1.15	1.2	1.0	1.1	2.4
3	1.75	1.65	1.7	1.7	1.7	1.6	1.4	1.1	1.15	1.0	1.1	1.6
4	2.35	1.6	1.7	1.7	1.65	1.7	1.5	1.1	1.15	1.0	1.2	1.35
5	2.3	1.6	1.7	1.65	1.65	2.05	1.5	1.2	1.15	1.0	1.1	1.3
6	2.1	1.7	1.65	1.7	1.7	1.8	1.45	1.6	1.5	1.0	1.1	2.45
7	2.0	1.6	1.65	1.65	2.1	1.7	1.4	1.2	1.35	1.0	1.1	4.0
8	1.85	1.6	1.6	1.6	1.95	1.6	1.4	1.25	1.3	1.0	1.1	2.2
9	1.8	1.55	1.6	1.6	1.85	1.6	1.4	1.3	1.25	1.2	1.1	1.8
10	1.8	1.7	1.6	1.6	1.8	1.55	1.95	1.2	1.2	1.2	1.05	1.7
11	1.7	1.65	2.3	1.55	1.75	1.55	1.55	1.2	1.2	1.15	1.3	1.65
12	2.3	1.65	2.25	1.5	1.7	1.5	1.45	1.2	1.15	1.1	1.2	1.9
13	2.1	1.7	2.0	1.5	1.65	1.5	1.4	1.1	1.15	1.1	1.1	1.75
14	2.0	2.2	1.9	1.5	1.6	1.8	1.35	1.1	1.15	1.1	1.4	1.65
15	1.9	2.8	1.8	2.0	1.6	1.55	1.35	1.1	1.1	1.1	1.3	1.6
16	1.9	2.3	1.75	1.8	1.55	1.5	1.35	1.1	1.1	1.1	1.2	1.55
17	1.85	2.25	1.7	1.75	1.5	1.45	1.35	1.1	1.1	1.05	1.15	1.5
18	1.8	2.0	1.7	1.75	2.15	1.4	1.3	1.15	1.1	1.05	1.1	1.45
19	1.8	1.9	1.65	1.95	1.8	1.4	1.5	1.5	1.05	1.0	1.1	1.5
20	1.75	1.8	2.15	1.8	1.7	1.4	1.4	1.2	1.05	1.0	1.1	1.4
21	1.7	1.8	2.1	1.75	1.65	1.4	1.3	1.6	1.1	1.0	1.1	1.55
22	1.7	1.75	1.8	1.7	1.6	1.35	1.25	1.65	1.1	1.0	1.1	2.2
23	1.7	1.7	3.7	1.65	1.55	1.35	1.25	1.6	1.1	1.4	1.1	2.0
24	1.6	1.6	3.4	1.6	1.5	1.35	1.2	1.5	1.1	1.2	1.05	1.8
25	1.6	1.6	2.6	3.1	1.9	1.35	1.2	1.8	1.05	1.15	1.05	1.75
26	1.75	1.7	2.3	2.2	1.7	1.3	1.2	1.55	1.05	1.1	1.05	1.7
27	1.8	1.65	2.1	2.1	1.65	1.3	1.2	1.5	1.15	1.1	1.0	1.65
28	1.65	1.6	2.0	2.0	1.7	1.3	1.6	1.35	1.15	1.25	1.0	1.6
29	1.6	1.6	1.9	1.9	3.55	1.3	1.25	1.3	1.1	1.5	1.0	1.6
30	1.6	.....	1.85	1.85	2.3	1.25	1.2	1.3	1.1	1.2	1.0	1.65
31	1.55	.....	1.8	.....	1.85	.....	1.2	1.25	.....	1.1	.....	1.7

Daily discharge, in second-feet, of Tusquitee Creek near Hayesville, N. C., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	84	102	68	120	53	93
2	.....	.....	.....	.....	.....	.....	84	84	68	102	190	84
3	.....	.....	.....	.....	.....	.....	84	84	76	93	102	84
4	.....	.....	.....	.....	.....	170	76	68	76	93	84	76
5	.....	.....	.....	.....	.....	160	68	68	68	102	76	76
6	.....	.....	.....	.....	.....	140	76	102	60	84	76	76
7	.....	.....	.....	.....	.....	140	68	68	60	84	68	76
8	.....	.....	.....	.....	.....	200	68	68	60	84	68	76
9	.....	.....	.....	.....	.....	160	76	68	68	76	60	84
10	.....	.....	.....	.....	.....	140	68	68	130	68	.....	.....
11	.....	.....	.....	.....	.....	140	84	60	84	68	140	.....
12	.....	.....	.....	.....	.....	130	102	84	60	60	120	160
13	.....	.....	.....	.....	.....	120	200	68	53	60	102	102
14	.....	.....	.....	.....	.....	120	102	84	53	60	93	120
15	.....	.....	.....	.....	.....	102	102	68	53	53	84	120
16	.....	.....	.....	.....	.....	102	102	160	53	53	76	120
17	.....	.....	.....	.....	.....	102	102	120	53	53	76	111
18	.....	.....	.....	.....	.....	102	93	.....	53	53	130	102
19	.....	.....	.....	.....	.....	102	120	140	53	53	93	102
20	.....	.....	.....	.....	102	111	111	120	46	46	84	102
21	.....	.....	.....	.....	102	102	84	160	46	46	102	93
22	.....	.....	.....	.....	102	102	84	200	.....	46	140	93
23	.....	.....	.....	.....	84	84	84	170	.....	53	180	140
24	.....	.....	.....	.....	84	93	76	150	111	53	.....	140
25	.....	.....	.....	.....	102	93	68	140	84	53	180	130
26	.....	.....	.....	.....	.....	111	68	120	76	53	160	120
27	.....	.....	.....	.....	170	84	76	102	68	111	140	120
28	.....	.....	.....	.....	140	84	76	102	.....	76	120	140
29	.....	.....	.....	.....	120	102	.....	84	.....	68	111	120
30	.....	.....	.....	.....	130	93	200	76	150	60	102	.....
31	.....	.....	.....	.....	.....	.....	120	68	.....	53	.....	.....
1908.												
1	200	170	120	160	160	150	60	46	60	40	40	200
2	170	150	160	150	150	130	140	46	53	30	40	.....
3	150	130	140	140	140	120	84	40	46	30	40	120
4	.....	120	140	140	130	140	102	40	46	30	53	76
5	.....	120	140	130	130	.....	102	53	46	30	40	68
6	.....	140	130	140	140	160	93	120	102	30	40	.....
7	200	120	130	130	.....	140	84	53	76	30	40	.....
8	170	120	120	120	190	120	84	60	68	30	40	.....
9	160	111	120	120	170	120	84	68	60	53	40	160
10	160	140	120	120	160	111	190	53	53	53	35	140
11	140	130	.....	111	150	111	111	53	53	46	68	130
12	.....	130	.....	102	140	102	93	53	46	40	53	180
13	.....	140	200	102	130	102	84	40	46	40	46	150
14	200	.....	180	102	120	160	76	40	46	40	84	130
15	180	.....	160	200	120	111	76	40	40	40	68	120
16	180	.....	150	160	111	102	76	40	40	40	53	111
17	170	.....	140	150	102	93	76	40	40	35	46	102
18	160	200	140	150	.....	84	68	46	40	35	40	93
19	160	180	130	190	160	84	102	102	35	30	40	102
20	150	160	.....	160	140	84	84	53	35	30	40	84
21	140	160	.....	150	130	84	68	120	40	30	40	111
22	140	150	160	140	120	76	60	130	40	30	40	.....
23	140	140	.....	130	111	76	60	120	40	84	40	200
24	120	120	.....	120	102	76	53	102	40	53	35	160
25	120	120	.....	.....	180	76	53	160	35	46	35	150
26	150	140	.....	.....	140	68	53	111	35	40	35	140
27	160	130	.....	.....	130	68	53	102	46	40	30	130
28	130	120	200	200	140	68	120	76	46	60	30	120
29	120	120	180	180	.....	68	60	68	40	102	30	120
30	120	.....	170	170	.....	60	53	68	40	53	30	130
31	111	.....	160	.....	170	.....	53	60	.....	40	.....	140

NOTE.—Daily discharge for 1907 and 1908 based on a fairly well-defined rating curve. On missing days beginning May 20, 1907, the discharge was greater than 200 second-feet.

VALLEY RIVER AT TOMOTLA, N. C.

This station is located at a footbridge about 250 feet below a public road ford at Tomotla, N. C. It is 5 miles above Murphy, N. C., and about one-fourth mile above Rodgers Creek. It was established June 29, 1904. The records are probably of more value as showing the amount of water entering the Hiwassee River below the Murphy station than for estimates of power in Valley River.

Discharge measurements are made from the single-span footbridge, where the section is good for measurements.[a]

Discharge measurements of Valley River at Tomotla, N. C., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 18	F. A. Murray	58	145	1.89	228
August 20	do	56	118	1.38	131
Do	F. P. Thomas	55	118	1.39	163
October 15	O. P. Hall	56	115	1.23	111
1908.					
April 16	M. R. Hall	57	171	2.23	391
Do	do	57	172	2.22	390
August 15	F. P. Thomas	55	112	1.18	90
November 18	M. R. Hall	54	100	1.03	75
November 19	do	54	100	1.03	76

Daily gage height, in feet, of Valley River at Tomotla, N. C., for 1907 and 1908.

[Observer, J. T. Hayes.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.6	3.0	3.3	2.1	1.9	3.4	1.9	1.5	1.3	1.6	1.2	1.6
2	3.2	2.9	4.0	2.1	1.9	3.2	1.75	1.4	1.35	1.5	1.55	1.6
3	3.1	2.8	3.8	1.8	1.8	2.4	1.7	1.4	1.4	1.45	1.35	1.55
4	3.0	2.6	3.7	1.8	2.0	2.0	1.65	1.3	1.4	1.4	1.3	1.5
5	3.0	4.1	3.7	1.7	1.9	1.8	1.6	1.8	1.35	1.7	1.2	1.5
6	2.8	3.8	3.0	2.5	1.8	1.8	1.6	1.45	1.3	1.4	1.2	1.5
7	2.7	3.6	2.8	2.5	2.3	1.7	1.55	1.4	1.3	1.4	1.2	1.4
8	2.65	3.2	2.5	2.0	2.0	2.0	1.5	1.3	1.3	1.6	1.2	1.6
9	2.6	3.0	2.8	2.0	1.9	1.9	1.5	1.25	1.3	1.4	1.2	2.45
10	2.55	2.7	3.5	1.9	1.9	1.8	1.4	1.2	1.25	1.3	2.75	2.0
11	2.5	2.6	3.4	2.0	3.5	1.9	1.55	1.2	1.45	1.3	2.55	1.8
12	2.5	2.5	3.3	1.9	2.5	2.4	2.1	1.2	1.25	1.3	2.0	1.8
13	2.4	2.4	3.0	1.8	2.0	2.2	2.6	1.25	1.2	1.25	1.7	1.75
14	2.4	2.3	2.8	1.8	1.9	1.8	1.9	1.35	1.1	1.2	1.6	2.55
15	2.35	2.1	2.4	2.0	2.5	1.8	1.85	1.65	1.1	1.2	1.5	2.4
16	2.3	2.0	2.3	1.9	2.3	1.8	1.65	1.6	1.1	1.2	1.5	2.15
17	2.4	2.0	2.2	1.9	2.0	1.7	1.6	1.7	1.1	1.2	1.5	2.1
18	2.4	1.95	2.15	1.8	1.9	1.7	1.65	1.8	1.1	1.2	1.65	2.0
19	2.35	1.9	2.1	1.9	1.9	1.8	1.6	1.55	1.1	1.2	1.55	1.9
20	2.7	1.9	2.1	1.9	1.8	1.8	1.6	1.4	1.1	1.2	1.5	1.8
21	2.6	1.9	2.0	2.0	1.8	1.7	1.55	1.4	1.2	1.15	1.9	1.7
22	2.55	2.0	2.0	2.0	1.7	1.7	1.5	1.9	2.0	1.1	1.9	1.7
23	2.5	2.0	2.0	3.0	1.7	2.0	1.7	2.05	4.0	1.1	3.4	2.35
24	2.5	2.1	1.95	2.9	1.7	1.9	1.4	1.85	2.1	1.2	3.5	2.2
25	2.45	2.2	1.90	2.8	1.7	2.0	1.65	1.6	1.35	1.1	2.65	2.1
26	2.4	2.1	2.1	2.3	2.5	1.8	1.6	1.4	1.3	1.15	2.05	2.0
27	2.4	2.0	1.9	2.2	2.0	1.8	1.5	1.35	1.3	1.45	1.95	1.9
28	2.5	2.2	1.85	2.1	1.9	1.7	1.45	1.4	1.85	1.5	1.85	1.9
29	2.55	.....	1.8	2.0	1.8	2.5	1.7	1.4	2.15	1.2	1.8	2.0
30	2.6	.....	1.75	2.0	1.7	1.9	2.2	1.3	1.65	1.2	1.75	5.4
31	2.7	.....	2.1	.....	2.7	.....	1.85	1.3	.....	1.2	.....	3.5

[a] All records of discharge at this station prior to 1908 have been collected by engineers of the United States Geological Survey and will be republished by the North Carolina Geological Survey, Dr. J. H. Pratt, state geologist, in a bulletin entitled "Water powers of North Carolina."

Daily gage height, in feet, of Valley River at Tomotla, N. C., for 1907 and 1908—Con.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	2.85	3.2	2.1	2.1	2.05	1.55	1.2	1.15	1.2	0.9	1.0	1.3
2	2.45	2.55	2.2	2.05	2.0	1.5	1.2	1.2	1.2	.9	1.0	1.65
3	2.25	2.35	2.25	2.0	1.95	1.5	1.35	1.2	1.25	.9	1.0	1.15
4	3.0	2.15	2.25	1.95	1.9	1.95	1.85	1.25	1.3	.9	1.1	1.1
5	3.6	2.1	2.25	2.1	2.0	1.65	1.6	1.3	1.75	.9	1.0	1.1
6	2.95	2.25	2.1	2.05	1.9	1.6	1.7	1.35	1.55	.9	1.0	1.2
7	2.75	2.1	2.05	2.1	2.85	1.6	1.45	1.9	1.0	.9	1.0	6.3
8	2.5	2.0	2.0	1.85	2.35	1.6	2.05	1.4	1.0	.9	1.0	4.4
9	2.3	2.0	2.0	1.8	2.15	1.5	1.65	1.25	1.0	.95	1.0	3.25
10	2.2	2.2	2.0	1.8	2.05	1.45	2.2	1.2	.9	1.35	1.0	2.1
11	3.0	2.2	3.2	1.8	1.95	1.4	1.65	1.25	.9	1.0	1.0	1.5
12	4.0	2.2	2.7	1.7	1.85	1.5	1.55	1.2	.9	1.0	1.1	1.5
13	2.8	2.2	2.5	1.7	1.8	1.6	1.5	1.1	.9	.9	1.25	1.7
14	2.55	2.3	2.45	1.7	1.8	1.6	1.4	1.1	.9	.9	1.35	1.7
15	2.65	5.9	2.35	2.45	1.7	1.5	1.45	1.1	.9	.9	1.2	1.6
16	2.55	3.4	2.15	2.45	1.7	1.5	1.45	1.1	.9	.9	1.1	1.55
17	2.55	2.95	2.05	2.75	1.7	1.5	1.45	1.25	.9	.9	1.0	1.5
18	2.4	2.6	2.05	2.55	1.8	1.95	1.3	1.1	.9	.9	1.0	1.55
19	2.3	2.6	3.2	2.5	2.0	1.65	1.3	1.05	.9	.9	1.0	1.5
20	2.2	2.45	2.5	2.25	1.8	1.6	1.25	1.0	.9	.9	1.0	2.5
21	2.15	2.3	2.5	2.15	1.65	1.4	1.2	1.1	.9	.9	1.0	1.7
22	2.15	2.2	2.5	2.05	1.6	1.3	1.2	1.75	.9	.9	1.0	1.5
23	2.1	2.1	4.8	2.0	1.6	1.3	1.2	2.05	.9	1.3	1.0	1.6
24	2.05	2.1	5.4	1.9	1.7	1.3	1.25	1.8	.9	1.15	1.0	1.5
25	1.9	2.1	4.6	3.3	1.85	1.3	1.25	1.35	.9	1.0	1.0	1.5
26	1.95	2.25	3.4	2.85	1.85	1.3	1.2	1.9	.9	1.0	1.0	1.5
27	2.05	2.1	2.6	2.6	1.85	1.3	1.2	1.8	.9	1.4	1.05	1.55
28	1.9	2.0	2.4	2.3	1.7	1.3	1.25	1.3	.9	1.4	1.0	1.7
29	1.9	2.0	2.3	2.15	1.6	1.2	1.3	1.25	.9	1.25	1.05	1.45
30	1.85	.....	2.3	2.25	1.65	1.2	1.2	1.2	.9	1.1	1.0	1.7
31	2.0	.....	2.2	.....	1.6	.....	1.2	1.2	.....	1.0	.....	2.1

Rating tables for Valley River at Tomotla, N. C.

FOR 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.10	74	2.20	345	3.30	775	4.40	1,415
1.20	92	2.30	375	3.40	825	4.50	1,480
1.30	112	2.40	405	3.50	875	4.60	1,545
1.40	134	2.50	440	3.60	930	4.70	1,610
1.50	156	2.60	475	3.70	985	4.80	1,680
1.60	180	2.70	515	3.80	1,040	4.90	1,750
1.70	205	2.80	555	3.90	1,100	5.00	1,820
1.80	230	2.90	595	4.00	1,160	5.20	1,960
1.90	255	3.00	635	4.10	1,220	5.40	2,100
2.00	285	3.10	680	4.20	1,285		
2.10	315	3.20	725	4.30	1,350		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on six discharge measurements made during 1906 and 1907, and is well defined between gage heights 1.2 feet and 3.0 feet. Above gage height 4.7 feet the rating curve is a tangent, the difference being 70 per tenth.

FOR 1908.

0.90	54	2.00	310	3.10	745	4.40	1,500
1.00	68	2.10	345	3.20	795	4,60	1,630
1.10	84	2.20	380	3.30	845	4.80	1,770
1.20	102	2.30	415	3.40	895	5.00	1,910
1.30	122	2.40	450	3.50	950	5.20	2,050
1.40	143	2.50	490	3.60	1,005	5.40	2,190
1.50	166	2.60	530	3.70	1,060	5.60	2,330
1.60	191	2.70	570	3.80	1,120	5.80	2,470
1.70	218	2.80	610	3.90	1,180	6.00	2,610
1.80	247	2.90	655	4.00	1,240	6.20	2,750
1.90	278	3.00	700	4.20	1,370	6.40	2,895

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on five discharge measurements made during 1908 and the form of previous curves and is well defined below gage height 2.5 feet.

Monthly discharge of Valley River at Tomotla, N. C., for 1907 and 1908.

[Drainage area, 106 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	930	375	490	4.62	5.33	C.
February	1,220	255	468	4.42	4.60	C
March	1,160	218	511	4.82	5.56	C.
April	635	205	316	2.98	3.32	C.
May	875	205	302	2.85	3.29	C.
June	825	205	294	2.77	3.09	C.
July	475	134	205	1.93	2.22	C.
August	300	92	153	1.44	1.66	C.
September	1,160	74	167	1.58	1.76	C.
October	205	74	114	1.08	1.24	C.
November	875	92	252	2.38	2.66	C.
December	2,100	134	338	3.19	3.68	C.
The year	2,100	74	301	2.84	38.41	
1908.						
January	1 240	262	486	4.58	5.28	C.
February	2,540	310	503	4.75	5.12	C.
March	2,190	310	588	5.55	6.40	C.
April	845	218	378	3.57	3.98	C.
May	632	191	273	2.58	2.97	C.
June	294	102	166	1.57	1.75	C.
July	380	102	153	1.44	1.66	C.
August	328	68	135	1.27	1.46	C.
September	232	54	72.9	.688	.77	C.
October	143	54	71.0	.670	.77	C.
November	132	68	74.9	.707	.79	C.
December	2,820	84	339	3.20	3.69	C
The year	2,820	54	270	2.55	34.64	

TOCCOA RIVER NEAR DIAL, GA.

This station was established on May 17, 1907, in cooperation with the Forest Service. It is located at Butts Bridge about 2 miles above Dial, Ga., and one-half mile below the mouth of Skeenah Creek. Blue Ridge, Ga., 18 miles from the station, is the nearest railroad point.

The current is swift and is somewhat rough and broken, but is fairly good for measurements.

The station was discontinued on December 31, 1907.

Discharge measurements of Toccoa River near Dial, Ga., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 17	F. A. Murray	73	173	3.50	335
August 19	do	69	185	3.29	246
Do	do	69	184	3.29	243
October 11	O. P. Hall	73	152	3.12	183

Daily gage height, in feet, of Toccoa River near Dial, Ga., for 1907 and 1908.

[Observer, Elzie Chastain.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	3.8	3.4	3.1	3.0	3.5	3.0	3.3
2	.....	.....	.....	.....	.....	3.6	3.4	3.1	3.0	3.5	3.6	3.3
3	.....	.....	.....	.....	.....	3.6	3.4	3.1	3.4	3.4	3.0	3.3
4	.....	.....	.....	.....	.....	3.5	3.2	3.1	3.2	3.3	3.0	3.3
5	.....	.....	.....	.....	.....	3.5	3.3	3.1	3.2	3.3	3.0	3.2
6	.....	.....	.....	.....	.....	3.5	3.3	3.1	3.2	3.3	3.0	3.1
7	.....	.....	.....	.....	.....	3.4	3.2	3.1	3.1	3.3	3.0	3.1
8	.....	.....	.....	.....	.....	4.1	3.3	3.1	3.0	3.3	3.0	3.1
9	.....	.....	.....	.....	.....	3.6	3.1	3.1	3.0	3.1	3.0	4.5
10	.....	.....	.....	.....	.....	3.5	3.2	3.0	3.0	3.0	4.0	4.0
11	.....	.....	.....	.....	.....	3.5	3.2	3.0	3.0	3.0	3.3	3.7
12	.....	.....	.....	.....	.....	3.4	3.2	3.9	3.0	3.0	3.3	3.7
13	.....	.....	.....	.....	.....	3.4	3.5	3.2	3.0	3.0	3.2	4.0
14	.....	.....	.....	.....	.....	3.4	3.3	3.2	3.0	3.0	3.2	4.2
15	.....	.....	.....	.....	.....	3.5	3.3	4.0	3.0	3.0	3.2	3.8
16	.....	.....	.....	.....	.....	3.4	3.3	3.1	3.0	3.0	3.1	3.7
17	.....	.....	.....	.....	3.5	3.3	3.3	3.1	3.0	3.0	3.2	3.6
18	.....	.....	.....	.....	3.5	3.3	4.6	3.4	3.0	3.0	3.2	3.6
19	.....	.....	.....	.....	3.5	3.3	3.6	3.2	3.0	3.0	3.1	3.5
20	.....	.....	.....	.....	3.4	3.3	3.6	3.1	3.0	3.0	3.1	3.5
21	.....	.....	.....	.....	3.4	3.3	3.4	3.1	3.0	3.0	3.8	3.5
22	.....	.....	.....	.....	3.4	3.3	3.4	3.2	3.4	3.0	3.7	3.8
23	.....	.....	.....	.....	3.4	3.3	3.4	3.2	5.5	3.0	4.7	4.1
24	.....	.....	.....	.....	3.4	3.4	3.1	3.3	3.6	3.0	4.0	3.9
25	.....	.....	.....	.....	3.4	3.4	3.0	3.1	3.3	3.0	3.6	3.8
26	.....	.....	.....	.....	4.0	3.4	3.2	3.1	3.3	3.0	3.6	3.7
27	.....	.....	.....	.....	3.5	3.4	3.1	3.0	3.3	3.5	3.5	3.6
28	.....	.....	.....	.....	3.5	3.4	3.1	3.0	4.0	3.2	3.5	3.6
29	.....	.....	.....	.....	3.4	3.4	3.2	3.1	3.7	3.0	3.4	3.6
30	.....	.....	.....	.....	3.4	3.4	3.3	3.1	3.5	3.0	3.3	5.0
31	.....	.....	.....	.....	4.1	.....	3.3	3.1	.....	3.0	.....	4.0

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	3.8	4.2	3.8	3.7	3.8	3.4	16	4.2	4.6	3.6	4.0	3.6	3.4
2	3.7	4.0	3.8	3.7	3.8	3.4	17	3.8	4.2	3.6	4.0	3.6	3.35
3	3.7	3.7	3.8	3.7	3.9	3.4	18	3.8	4.1	3.6	4.2	3.7	3.5
4	4.0	3.7	3.8	3.7	3.8	3.5	19	3.8	4.1	3.5	4.1	3.65	3.4
5	4.2	4.0	3.8	3.8	3.9	3.5	20	3.8	4.0	4.5	3.9	3.6	3.4
6	4.0	3.8	3.8	3.8	3.7	3.5	21	3.8	4.0	3.9	3.8	3.6	3.4
7	4.0	3.7	3.7	3.7	4.0	3.4	22	3.8	4.0	3.9	3.8	3.5	3.4
8	3.8	3.6	3.7	3.7	3.8	3.4	23	3.8	4.0	6.0	3.8	3.4	3.4
9	3.7	3.7	3.6	3.7	3.7	3.4	24	3.7	3.8	4.5	3.8	3.4	3.3
10	3.7	4.6	3.6	3.65	3.7	3.4	25	3.7	3.8	4.3	4.5	3.5	3.3
11	5.7	4.2	3.6	3.6	3.7	3.4	26	3.8	4.1	4.0	4.0	3.5	3.25
12	4.5	4.0	3.8	3.6	3.7	3.4	27	3.8	4.0	4.0	4.0	3.5	3.25
13	4.2	4.1	3.6	3.6	3.65	3.5	28	3.8	3.8	4.0	4.0	3.5	3.2
14	4.0	4.0	3.6	3.6	3.65	3.5	29	3.7	3.8	3.8	3.9	3.4	3.2
15	3.9	7.6	3.6	4.3	3.6	3.4	30	3.6	.....	3.8	4.0	3.5	3.2
							31	4.5	.....	3.7	.....	3.5	.....

Daily discharge, in second-feet, of Toccoa River near Dial, Ga., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	500	290	177	150	335	150	247
2	.....	.....	.....	.....	.....	385	290	177	150	335	385	247
3	.....	.....	.....	.....	.....	385	290	177	290	290	150	247
4	.....	.....	.....	.....	.....	335	210	177	210	247	150	247
5	.....	.....	.....	.....	.....	335	247	177	210	247	150	210
6	.....	.....	.....	.....	.....	335	247	177	210	247	150	177
7	.....	.....	.....	.....	.....	290	210	177	177	247	150	177
8	.....	.....	.....	.....	.....	.....	247	177	150	247	150	177
9	.....	.....	.....	.....	.....	385	177	177	150	177	150	.....
10	.....	.....	.....	.....	.....	335	210	150	150	150	.....	.....
11	.....	.....	.....	.....	.....	335	210	150	150	150	247	440
12	.....	.....	.....	.....	.....	290	210	.....	150	150	247	440
13	.....	.....	.....	.....	.....	290	335	210	150	150	210	.....
14	.....	.....	.....	.....	.....	290	247	210	150	150	210	.....
15	.....	.....	.....	.....	.....	335	247	.....	150	150	210	500
16	.....	.....	.....	.....	.....	290	247	177	150	150	177	440
17	.....	.....	.....	.....	335	247	247	177	150	150	210	385
18	.....	.....	.....	.....	335	247	.....	290	150	150	210	385
19	.....	.....	.....	.....	335	247	385	210	150	150	177	335
20	.....	.....	.....	.....	290	247	385	177	150	150	177	335
21	.....	.....	.....	.....	290	247	290	177	150	150	500	335
22	.....	.....	.....	.....	290	247	290	210	290	150	440	500
23	.....	.....	.....	.....	290	247	290	210	.....	150	.....	.....
24	.....	.....	.....	.....	290	290	177	247	385	150	.....	.....
25	.....	.....	.....	.....	290	290	150	177	247	150	385	500
26	.....	.....	.....	.....	.....	290	210	177	247	150	385	440
27	.....	.....	.....	.....	335	290	177	150	247	335	335	385
28	.....	.....	.....	.....	335	290	177	150	.....	210	335	385
29	.....	.....	.....	.....	290	290	210	177	440	150	290	385
30	.....	.....	.....	.....	290	290	247	177	335	150	247	.....
31	.....	.....	.....	.....	.....	.....	247	177	.....	150	.....	.....

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1908.							1908.						
1	500	.....	500	440	500	290	16	.....	.....	385	.....	385	290
2	440	.....	500	440	500	290	17	500	.....	385	.....	385	268
3	440	440	500	440	550	290	18	500	.....	385	.....	440	335
4	.....	440	500	440	500	335	19	500	.....	335	.....	412	290
5	.....	.....	500	500	550	335	20	500	.....	.....	550	385	290
6	.....	500	500	500	440	335	21	500	.....	550	500	385	290
7	.....	440	440	440	.....	290	22	500	.....	550	500	335	290
8	500	385	440	440	500	290	23	500	.....	.....	500	290	290
9	440	440	385	440	440	290	24	440	500	.....	500	290	247
10	440	.....	385	412	440	290	25	440	500	.....	.....	335	247
11	.....	.....	385	385	440	290	26	500	.....	.....	.....	335	228
12	.....	.....	500	385	440	290	27	500	.....	.....	.....	335	228
13	.....	.....	385	385	412	290	28	500	500	.....	.....	335	210
14	.....	.....	385	385	412	335	29	440	500	500	550	290	210
15	550	.....	385	.....	412	335	30	385	.....	500	.....	335	210
							31	.....	.....	440	.....	335	.....

NOTE.—Daily discharge 1907–8 based on a fairly well-defined rating curve. On missing days from May 17, 1907, to June 30, 1908, the discharge was greater than 550 second-feet.

OCOEE RIVER AT McCAYS, TENN.

This station is located at a suspension footbridge just below McCays Ferry at McCays, Tenn., near the Georgia-Tennessee boundary and one-half mile below the railroad bridge of the Louisville and Nashville Railroad. It is one-half mile above the mouth of Fightingtown Creek. It was established March 21, 1903. The records are especially valuable for estimates of water power, there being a great amount of fall in the river below.

Discharge measurements are made from the suspension footbridge where the section is excellent. Swinging or shaking of the bridge

during discharge measurements may cause some error, but this is not thought to be serious.

The name of the town has been changed to Copperhill.

Discharge measurements of Ocoee River at McCays, Tenn., in 1907.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 26	M. R. Hall	157	544	1.70	962
August 17	F. A. Murray	148	420	1.02	526
October 10	O. P. Hall	150	364	.93	509

Daily gage height, in feet, of Ocoee River at McCays, Tenn., for 1907 and 1908.

[Observer, Arch Ballew.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.95	3.2	2.05	1.8	1.5	3.0	1.2	1.0	0.7	1.2	0.78	1.15
2	2.5	2.65	4.2	1.5	1.45	2.05	1.2	1.0	.7	1.1	1.05	1.1
3	2.4	2.35	2.7	1.4	1.4	1.8	1.2	1.0	1.1	1.1	1.2	1.1
4	2.25	2.4	2.2	1.4	1.7	1.6	1.2	.9	1.15	1.1	.88	1.1
5	2.1	3.2	2.0	1.4	1.5	1.5	1.45	.9	.85	1.1	.82	1.1
6	2.1	2.65	1.9	2.25	1.4	1.45	1.25	1.0	.8	1.05	.85	1.0
7	2.0	2.2	1.9	1.6	1.6	1.4	1.1	.95	.75	.98	.85	1.0
8	1.9	2.1	2.0	1.6	1.7	2.1	1.0	.9	.8	1.1	.8	1.0
9	1.9	2.0	1.8	1.55	1.7	1.8	1.0	.85	1.4	1.0	.8	1.15
10	1.9	1.9	1.8	1.5	1.5	1.5	1.0	.88	1.1	.9	1.5	2.25
11	1.9	1.8	1.8	1.45	1.8	1.5	1.2	.8	1.45	.9	1.4	1.6
12	1.85	1.8	1.7	1.7	1.6	1.55	2.3	1.2	.85	.85	1.0	1.5
13	1.8	1.8	1.7	1.5	1.5	1.55	2.3	1.35	.75	.85	1.0	1.65
14	1.8	1.7	1.7	1.4	1.4	1.4	1.7	1.6	.7	.85	.9	2.3
15	1.8	1.7	1.85	1.4	1.95	1.3	1.3	1.15	.6	.85	.9	1.85
16	1.7	1.65	1.7	1.5	1.75	1.3	1.2	2.35	.7	.82	.82	1.7
17	1.7	1.6	1.6	1.5	1.6	1.2	1.2	1.0	.7	.8	.82	1.6
18	1.7	1.6	1.6	1.4	1.5	1.2	2.0	2.25	.7	.8	1.2	1.5
19	1.7	1.6	1.6	1.8	1.6	1.3	1.8	1.55	.7	.8	1.2	1.5
20	2.0	1.6	1.6	1.6	1.4	1.3	1.3	1.05	.65	.8	1.15	1.4
21	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.0	.65	.8	1.8	1.3
22	1.7	1.55	1.5	1.75	1.35	1.4	1.2	1.0	2.3	.8	1.6	1.3
23	1.7	1.5	1.5	2.3	1.3	1.4	1.1	1.0	4.8	.8	2.9	2.85
24	1.6	1.5	1.5	2.15	1.3	1.5	1.0	1.1	1.65	.8	2.9	1.2
25	1.6	1.75	1.45	1.9	1.35	2.35	1.0	1.1	1.2	.75	1.85	1.85
26	1.7	2.05	1.5	1.75	2.1	1.8	1.2	.9	1.0	.72	1.55	1.7
27	1.6	2.1	1.4	1.7	1.6	1.5	1.1	.8	1.3	1.1	1.45	1.6
28	1.55	1.9	1.4	1.6	1.4	1.3	1.0	.8	1.5	1.45	1.4	1.6
29	1.6	.....	1.4	1.55	1.3	1.6	1.0	.9	2.4	1.8	1.25	2.65
30	1.55	.....	1.4	1.5	2.0	1.3	1.5	.85	1.35	.8	1.2	3.4
31	1.65	.....	1.5	.....	2.15	.....	1.1	.8	.....	.8	.....	3.2
1908.												
1	2.35	3.5	2.0	2.0	2.2	1.5	1.0	.9	.9	.65	.7	1.3
2	2.1	2.35	2.0	1.95	2.1	1.4	1.05	.9	.9	.62	.7	1.45
3	1.9	2.0	2.0	1.9	2.0	1.45	1.25	.85	.82	.6	.75	.92
4	1.8	2.0	2.0	1.9	2.0	2.05	1.95	.85	.8	.6	.9	.8
5	3.4	1.9	1.9	2.05	2.15	1.75	2.6	1.25	1.65	.6	.75	1.05
6	2.5	2.1	1.9	2.45	2.0	1.7	2.05	1.3	2.1	.6	.7	1.2
7	2.4	1.85	1.9	2.05	3.5	1.45	2.1	1.15	1.25	.6	.7	6.1
8	2.15	1.8	1.9	1.95	2.3	1.4	1.7	1.3	1.0	.6	.7	2.75
9	1.95	1.95	1.85	1.9	2.1	1.4	1.9	1.5	.95	1.2	.68	1.8
10	1.9	2.6	1.8	1.85	2.0	1.45	2.7	1.05	.9	1.6	.65	1.5
11	3.0	2.95	1.9	1.8	1.95	1.5	1.8	.95	.9	.85	.75	1.3
12	4.2	2.5	2.15	1.8	1.9	1.3	1.45	.92	.8	.75	.82	1.6
13	3.0	2.5	1.9	1.75	1.85	1.3	1.35	.85	.8	.7	.7	1.35
14	2.55	2.55	1.85	1.8	1.8	1.5	1.3	.85	.8	.7	.8	1.2
15	2.3	6.5	1.8	2.95	1.8	1.45	1.2	.8	.8	.7	.85	1.2
16	2.3	3.6	1.8	2.1	1.8	1.3	1.2	.8	.75	.65	.72	1.15
17	2.3	3.0	1.75	2.45	1.8	1.3	1.1	.82	.8	.65	.7	1.1
18	2.15	2.8	1.7	2.75	2.0	1.3	1.3	1.15	.75	.6	.65	1.1
19	2.0	2.8	1.75	2.8	2.05	1.3	1.2	.88	.75	.6	.65	1.2
20	2.0	2.55	2.65	2.45	1.9	1.2	1.1	.95	.75	.6	.65	1.3

Daily gage height, in feet, of Ocoee River at McCays, Tenn., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
21	1.95	2.4	2.8	2.25	1.75	1.55	1.0	0.85	0.78	0.62	0.65	1.45
22	1.9	2.3	2.3	2.1	1.7	1.45	1.0	2.8	.7	.6	.65	2.95
23	1.9	2.3	3.8	2.1	1.6	1.3	1.6	2.25	.72	.75	.65	2.2
24	1.8	2.2	4.7	2.0	1.7	1.2	1.15	1.8	.7	.88	.65	1.75
25	1.8	2.25	3.1	4.2	1.85	1.2	1.0	2.6	.65	.7	.65	1.55
26	1.8	2.6	2.65	2.7	1.9	1.1	1.0	1.5	.65	.62	.65	1.4
27	2.1	2.3	2.45	2.55	1.85	1.05	.9	1.25	.65	.6	.62	1.3
28	1.8	2.1	2.3	2.3	1.65	1.05	1.0	1.1	.7	.75	.6	1.3
29	1.9	2.05	2.2	2.2	1.6	1.05	1.35	1.0	.75	1.2	.6	1.3
30	1.8	.....	2.1	2.2	1.8	1.05	1.15	1.0	.65	1.0	.65	1.2
31	1.8	.....	2.1	.....	1.5	.....	1.0	.9	.....	.8	.....	1.45

Rating table for Ocoee River at McCays, Tenn., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.60	360	1.80	990	3.00	1,790	4.40	2,850
.70	400	1.90	1,055	3.10	1,860	4.60	3,015
.80	445	2.00	1,120	3.20	1,930	4.80	3,185
.90	490	2.10	1,185	3.30	2,000	5.00	3,360
1.00	540	2.20	1,250	3.40	2,075	5.20	3,540
1.10	590	2.30	1,315	3.50	2,150	5.40	3,730
1.20	640	2.40	1,380	3.60	2,225	5.60	3,930
1.30	695	2.50	1,445	3.70	2,300	5.80	4,130
1.40	750	2.60	1,510	3.80	2,375	6.00	4,330
1.50	810	2.70	1,580	3.90	2,450	6.20	4,530
1.60	870	2.80	1,650	4.00	2,530	6.40	4,740
1.70	930	2.90	1,720	4.20	2,690	6.60	4,960

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on seven discharge measurements made during 1906 and 1907 and the form of previous curves, and is well defined between gage heights 0.9 feet and 3.5 feet. Above gage height 1.0 foot the table is the same as the 1906 table.

Monthly discharge of Ocoee River at McCays, Tenn., for 1907 and 1908.

[Drainage area, 374 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	1,760	840	1,040	2.78	3.20	A.
February	1,930	810	1,110	2.97	3.09	A.
March	2,690	750	995	2.66	3.07	A.
April	1,320	750	891	2.38	2.66	A.
May	1,220	695	857	2.29	2.64	A.
June	1,790	640	861	2.30	2.57	A.
July	1,320	540	705	1.89	2.18	A.
August	1,350	445	598	1.60	1.84	A.
September	3,180	360	670	1.79	2.00	A.
October	990	409	522	1.40	1.61	A.
November	1,720	436	694	1.86	2.08	A.
December	2,080	540	920	2.46	2.84	A.
The year	3,180	360	822	2.20	29.78	
1908.						
January	2,690	990	1,270	3.40	3.92	A.
February	4,850	990	1,520	4.06	4.38	A.
March	3,100	930	1,280	3.42	3.94	A.
April	2,690	960	1,280	3.42	3.82	A.
May	2,150	810	1,080	2.89	3.33	A.
June	1,150	565	736	1.97	2.20	A.
July	1,580	490	768	2.05	2.36	A.
August	1,650	445	658	1.76	2.03	A.
September	1,180	380	485	1.30	1.45	A.
October	870	360	424	1.13	1.30	A.
November	490	360	400	1.07	1.19	A.
December	4,430	445	903	2.41	2.78	A.
The year	4,850	360	900	2.41	32.70	

ELK RIVER NEAR ELKMONT, ALA.

This station is located at the wagon bridge near Wilson's store about 5 miles east of Elkmont, Ala., and 3 miles below the bridge of the Louisville and Nashville Railroad.

It was established June 24, 1904, for the purpose of obtaining flow data for the lower tributaries of the Tennessee River. There are also good water power possibilities on this river.

The station was discontinued on February 3, 1908.

Daily gage height, in feet, of Elk River near Elkmont, Ala., for 1907 and 1908.

[Observer, J. D. Tennison.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	12.5	13.0	11.8	2.9	5.1	4.5	2.3	2.2	2.0	1.9	1.65	3.2
2	7.5	12.9	18.7	2.8	3.85	3.6	2.3	2.0	1.9	1.8	2.75	3.1
3	7.0	12.6	12.5	2.8	3.6	3.4	3.7	2.0	1.7	1.9	.....	3.0
4	7.2	9.8	8.5	2.7	3.7	3.25	2.85	1.95	2.0	1.9	2.5	2.8
5	6.7	8.5	8.0	2.6	3.6	3.2	2.4	1.85	2.2	2.0	2.4	2.3
6	6.0	5.8	6.7	3.2	4.0	2.95	2.35	1.85	2.1	1.8	2.3	2.3
7	5.4	5.0	5.6	3.0	6.7	2.85	2.3	1.85	2.1	1.9	2.0	2.4
8	4.6	4.0	5.6	2.85	9.0	2.7	2.2	1.9	2.0	1.9	1.9	2.5
9	4.4	4.0	5.0	3.1	9.3	2.6	2.1	2.65	2.1	1.85	1.8	2.8
10	4.2	3.9	.....	3.0	7.2	2.7	2.0	2.7	2.1	1.8	3.7	3.0
11	4.0	3.8	7.1	2.85	13.0	3.6	2.2	2.5	2.0	1.8	3.65	3.35
12	3.9	3.7	6.2	2.85	10.2	3.15	3.35	2.3	1.95	1.7	3.35	3.0
13	3.7	3.55	5.6	2.8	8.5	2.75	5.35	2.2	1.9	1.6	3.3	2.95
14	3.5	3.4	5.7	2.75	7.3	2.75	3.15	2.0	1.8	1.6	1.95	3.0
15	3.45	3.3	6.5	2.6	7.9	3.2	2.95	1.9	1.7	1.6	1.9	3.1
16	3.25	3.25	9.8	2.5	6.4	3.4	2.7	2.35	1.7	1.6	2.0	3.5
17	3.15	3.2	7.9	2.6	6.0	2.9	2.5	2.15	1.85	1.6	2.0	3.3
18	3.15	3.1	6.3	2.6	5.4	2.7	2.3	2.0	1.8	1.6	2.6	3.2
19	3.15	3.0	5.3	2.8	4.4	2.5	2.2	1.95	1.8	1.5	2.6	3.1
20	4.6	2.95	4.5	3.1	4.0	2.4	2.3	1.85	1.8	1.6	3.5	3.0
21	4.5	2.95	4.2	3.15	3.6	2.35	2.1	1.8	1.7	1.6	3.3	3.0
22	4.0	2.9	3.9	3.2	3.2	2.3	2.0	1.9	4.7	1.65	3.4	2.9
23	3.8	2.85	3.75	3.5	3.2	2.3	2.1	2.1	4.5	1.7	3.6	4.8
24	3.6	3.1	3.5	3.2	3.15	2.5	2.1	2.05	3.4	1.65	3.5	3.8
25	3.4	3.6	3.4	2.9	3.1	2.3	2.0	1.9	3.0	1.6	3.5	3.3
26	3.3	3.35	3.3	2.9	3.05	3.0	2.05	1.8	2.6	1.6	3.5	3.0
27	3.2	3.4	3.2	2.85	3.0	3.4	2.1	1.7	2.7	1.6	3.6	3.0
28	3.1	3.7	3.1	.....	2.8	3.0	2.0	2.0	2.6	1.6	3.4	2.9
29	3.1	.....	3.0	2.8	2.75	2.7	2.15	2.1	2.0	1.6	2.7	3.0
30	3.4	.....	3.0	4.8	2.7	2.3	2.45	1.9	2.0	1.65	2.7	12.5
31	4.0	.....	3.1	.....	2.85	.....	2.4	2.0	.....	1.6	.....	10.5

Day.	Jan.	Feb.	Day.	Jan.	Feb.	Day.	Jan.	Feb.
1908.			1908.			1908.		
1	7.5	9.5	11	5.2	.....	21	4.3	.....
2	6.1	5.9	12	5.6	.....	22	4.0	.....
3	5.0	.....	13	5.4	.....	23	3.9	.....
4	6.5	.....	14	5.2	.....	24	3.6	.....
5	10.4	.....	15	4.6	.....	25	3.5	.....
6	8.4	.....	16	5.6	.....	26	3.3	.....
7	7.4	.....	17	5.4	.....	27	3.2	.....
8	5.8	.....	18	5.2	.....	28	3.1	.....
9	4.8	.....	19	5.0	.....	29	3.0	.....
10	4.2	.....	20	4.4	.....	30	2.95	.....
						31	3.0	.....

Rating table for Elk River near Elkmont, Ala., for 1905 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.50	315	3.10	1,970	4.70	5,190	7.40	12,880
1.60	375	3.20	2,130	4.80	5,430	7.60	13,520
1.70	440	3.30	2,300	4.90	5,680	7.80	14,160
1.80	510	3.40	2,480	5.00	5,930	8.00	14,800
1.90	585	3.50	2,660	5.20	6,450	9.00	18,000
2.00	660	3.60	2,840	5.40	6,980	10.00	21,200
2.10	740	3.70	3,030	5.60	7,520	11.00	24,400
2.20	830	3.80	3,220	5.80	8,080	12.00	27,600
2.30	930	3.90	3,420	6.00	8,640	13.00	30,800
2.40	1,040	4.00	3,620	6.20	9,210	14.00	34,000
2.50	1,150	4.10	3,830	6.40	9,790	15.00	37,200
2.60	1,270	4.20	4,040	6.60	10,380	16.00	40,400
2.70	1,400	4.30	4,260	6.80	10,980	17.00	43,600
2.80	1,530	4.40	4,490	7.00	11,600	18.00	46,800
2.90	1,670	4.50	4,720	7.20	12,240	19.00	50,000
3.00	1,820	4.60	4,950				

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on discharge measurements made during 1904 to 1906 and is well defined between gage heights 1.2 feet and 4.0 feet.

Monthly discharge of Elk River near Elkmont, Ala., for 1905, 1907, and 1908.

[Drainage area, 1,700 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1905.						
January	26,000	1,040	3,850	2.26	2.61	A.
February	39,100	1,530	12,400	7.29	7.59	B.
March	31,100	1,820	6,320	3.72	4.29	B.
April	4,260	830	1,650	.971	1.08	A.
May	29,500	1,150	4,620	2.72	3.14	A.
June	22,500	930	4,500	2.65	2.96	A.
July	31,400	660	4,070	2.39	2.76	A.
August	4,720	440	1,320	.776	.89	A.
September	6,450	345	914	.538	.60	A.
October	10,100	315	2,040	1.20	1.38	A.
November	1,270	475	663	.390	.44	A.
December	28,900	585	6,550	3.85	4.44	A.
The year	39,100	315	4,070	2.40	32.19	
1907.						
January	29,200	1,970	5,350	3.15	3.63	B.
February	30,800	1,600	6,920	4.07	4.24	B.
March	49,000	1,820	9,910	5.83	6.72	B.
April	5,430	1,150	1,790	1.05	1.17	A.
May	30,800	1,400	7,490	4.41	5.08	B.
June	4,720	930	1,760	1.04	1.16	A.
July	6,840	660	1,270	.747	.86	A.
August	1,400	440	716	.421	.49	A.
September	5,190	440	1,070	.629	.70	A.
October	660	315	447	.263	.30	A.
November	3,030	408	1,670	.982	1.10	A.
December	29,200	930	3,520	2.07	2.39	B.
The year	49,000	315	3,490	2.06	27.84	
1908.						
January	22,500	1,740	6,440	3.79	4.37	A.

NOTE.—The 1905 table of monthly discharge was omitted from Water-Supply Paper 205 through an oversight.

DUCK RIVER AT COLUMBIA, TENN.

This station is located at the highway bridge two blocks north of the public square at Columbia, Tenn. It is about 2 miles above the mouth of Rutherford Creek.

The original gage was established by the United States Weather Bureau, but readings were not made except at special times during high water. On October 21, 1904, an observer was employed by the United States Geological Survey and daily gage readings were maintained, using the United States Weather Bureau's vertical gage until a chain gage was installed in 1905. This gage is on the same datum.

The measuring section is good except at very low stage, when it becomes sluggish. Some of the discharge measurements have been made from a boat at a swifter place a short distance above.

Daily gage height, in feet, of Duck River at Columbia, Tenn., for 1907 and 1908.

[Observer, W. O. Cherry.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	18.0	8.6	7.4	1.4	2.2	5.0	1.05	1.0	0.9	0.8	0.75	1.6
2	10.0	17.4	19.3	1.35	1.85	4.2	1.4	1.05	.75	.8	1.2	1.55
3	6.0	13.5	18.3	1.3	1.7	3.4	6.0	.95	2.15	.85	2.65	1.35
4	6.9	8.0	10.4	1.25	1.9	2.75	2.95	.9	1.35	.75	2.0	1.25
5	7.2	6.4	6.0	1.3	1.9	2.3	1.6	.8	1.0	.7	1.4	1.2
6	5.7	4.3	4.2	1.55	7.8	2.0	1.25	.85	.9	.75	1.15	1.15
7	4.7	3.6	3.7	1.85	12.2	1.65	1.15	.75	.85	.75	1.0	1.1
8	3.7	3.1	3.6	1.75	9.4	1.45	1.05	.75	.9	.85	.9	1.05
9	.....	2.9	3.2	1.65	7.8	6.9	.95	.95	.8	.95	.8	1.0
10	3.2	2.7	10.6	1.45	5.9	4.7	1.05	1.15	1.0	.9	1.65	1.6
11	2.7	2.55	11.8	1.4	6.4	3.0	1.1	1.0	.9	.8	3.8	2.9
12	2.55	2.35	8.0	1.35	6.0	2.2	2.05	.9	1.1	.8	2.65	2.35
13	2.35	2.15	5.3	1.25	4.1	1.8	9.0	.9	1.25	.7	1.8	2.05
14	2.25	2.0	15.4	1.2	3.8	1.45	5.1	.8	.95	.75	1.45	2.5
15	2.2	1.85	16.4	1.2	5.5	3.4	3.0	.8	.8	.7	1.25	3.0
16	2.15	1.75	11.2	1.2	4.8	2.25	2.0	.85	.75	.7	1.1	2.65
17	2.45	1.6	7.2	1.15	3.8	1.65	1.6	.85	.7	.8	.8	2.35
18	2.5	1.55	5.2	1.1	3.2	1.45	1.3	.85	.75	.7	1.15	2.25
19	2.25	1.5	4.2	1.1	2.65	1.25	1.15	.85	.8	.65	1.3	2.6
20	4.6	1.4	3.6	1.75	2.3	1.1	2.0	.85	.65	.55	1.9	2.45
21	4.8	1.35	3.2	1.8	2.05	1.0	2.65	.85	.6	.6	2.95	2.1
22	3.7	1.3	2.7	1.55	1.75	1.0	1.9	.8	1.95	.6	2.6	2.0
23	3.2	1.2	2.35	1.45	1.6	.95	1.45	.85	7.5	.55	3.8	5.0
24	2.85	1.65	2.15	1.35	1.6	1.05	1.25	.75	3.7	.5	6.0	6.4
25	2.3	3.0	2.05	1.3	1.5	1.8	1.15	.7	2.05	.5	4.0	4.7
26	2.0	3.0	1.85	1.3	1.45	2.1	1.05	.7	1.4	.6	3.2	4.2
27	1.95	3.4	1.75	1.25	1.35	1.7	1.0	.7	1.15	.55	2.5	3.3
28	1.85	3.4	1.65	1.3	1.3	1.55	.9	.65	1.05	.6	2.1	2.65
29	1.7	.....	1.55	1.35	1.2	1.25	1.1	1.0	.85	.55	1.9	2.55
30	1.6	.....	1.45	2.2	1.15	1.15	1.05	1.2	.8	.6	1.75	5.2
31	1.6	.....	1.4	.....	2.85	.....	1.0	.95	.....	.7	.....	11.4
1908.												
1	8.6	9.3	2.8	2.7	2.0	1.8	.9	.7	.9	.95	.6	1.8
2	5.8	9.0	3.9	2.55	1.85	1.55	.9	1.05	.8	.9	.6	1.3
3	3.7	5.2	6.3	2.3	1.6	1.9	2.0	1.0	.8	.85	.6	1.2
4	5.9	4.5	6.2	2.0	1.55	3.1	1.25	.7	.7	.8	.6	1.15
5	12.9	4.4	5.2	2.35	4.7	2.9	1.2	.75	6.6	.8	.7	1.05
6	11.0	5.7	4.6	3.0	8.4	2.3	1.65	.75	3.2	.7	.7	1.15
7	7.4	4.8	3.8	2.65	5.8	1.85	1.6	.85	2.3	.7	.7	5.4
8	5.0	4.1	3.2	2.45	4.0	1.65	1.4	.9	1.5	.7	.65	5.8
9	3.8	3.5	3.0	2.15	3.0	3.1	1.25	1.15	1.25	.7	.7	3.2
10	3.2	10.4	2.95	1.95	2.6	2.5	1.2	1.25	1.05	.7	.7	2.6
11	3.4	16.6	3.8	1.75	2.25	2.35	1.1	1.15	1.0	.7	.6	2.0
12	5.4	11.6	10.1	1.65	1.95	2.5	1.0	1.05	.9	.7	.65	2.3
13	5.8	9.6	11.8	1.55	1.75	1.9	1.0	.95	.8	.75	.7	2.3
14	5.0	8.4	7.4	1.5	1.55	1.6	.9	.9	.8	.7	.7	2.05
15	4.4	14.6	4.8	1.4	2.35	1.5	.9	.85	.8	.7	.6	1.75

Daily gage height, in feet, of Duck River at Columbia, Tenn., for 1907 and 1908—Cont'd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	4.4	12.6	4.0	1.6	2.6	1.35	0.8	0.8	0.8	0.7	0.6	1.6
17	5.7	7.8	3.2	1.5	2.3	1.3	.8	.8	.7	.75	.7	1.35
18	4.8	5.6	2.75	2.3	2.75	1.2	.8	.8	.7	.65	.7	1.3
19	4.2	5.4	2.55	3.2	4.1	1.05	.7	.8	.7	.7	.65	1.2
20	3.4	5.8	3.2	2.65	3.5	1.0	.75	2.6	.7	.65	.6	1.2
21	2.95	4.4	2.95	2.35	2.6	.95	.7	3.9	3.9	.6	.6	1.1
22	2.75	4.1	3.3	1.95	2.2	.9	.85	2.25	4.8	.6	.6	2.3
23	2.55	3.4	4.2	1.75	2.05	.95	.8	1.6	3.2	.6	.65	9.7
24	2.35	2.9	9.0	4.6	1.6	1.05	.85	1.3	2.0	.6	.7	6.2
25	2.1	2.7	7.4	8.8	1.45	1.7	.85	1.4	1.3	.55	.7	3.1
26	1.95	3.6	5.4	4.6	3.9	1.55	.8	1.2	1.15	.55	.7	2.8
27	1.9	3.8	4.2	4.8	4.6	1.25	.7	1.05	1.0	.5	.7	2.5
28	1.8	3.6	3.6	3.2	3.2	1.1	.7	1.0	1.0	.6	1.9	2.6
29	1.75	3.0	3.4	2.4	2.3	.95	.75	.95	.95	.6	2.45	2.05
30	1.6	.....	3.8	2.15	2.25	.9	.75	.85	1.05	.6	2.45	2.25
31	1.75	.....	3.1	.....	2.2	.....	.7	.8	.....	.....	.....	2.35

Rating table for Duck River at Columbia, Tenn., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.50	100	2.10	1,160	3.70	2,530	6.60	5,140
.60	145	2.20	1,240	3.80	2.620	6.80	5,320
.70	195	2.30	1,320	3.90	2,710	7.00	5,500
.80	250	2.40	1,400	4.00	2.800	8.00	6,400
.90	310	2.50	1,480	4.20	2,980	9.00	7,300
1.00	375	2.60	1,560	4.40	3,160	10.00	8,200
1.10	440	2.70	1,645	4.60	3,340	11.00	9,100
1.20	510	2.80	1,730	4.80	3,520	12.00	10,000
1.30	580	2.90	1,815	5.00	3,700	13.00	10,900
1.40	650	3.00	1,900	5.20	3,880	14.00	11,800
1.50	720	3.10	1,990	5.40	4,060	15.00	12,700
1.60	790	3.20	2,080	5.60	4,240	16.00	13,600
1.70	860	3.30	2.170	5.80	4,420	17.00	14,500
1.80	930	3.40	2,260	6.00	4,600	18.00	15,400
1.90	1,005	3.50	2,350	6.20	4.780	19.00	16,300
2.00	1,080	3.60	2,440	6.40	4,960	20.00	17,200

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on discharge measurements made during 1901 and 1905 to 1906 and is well defined between gage heights 0.5 foot and 4.0 feet. Above gage height 4.0 feet it is based on one measurement made in 1901 at gage height 11.9 feet. Above gage height 3.0 feet the rating curve is a tangent, the difference being 90 per tenth.

Monthly discharge of Duck River at Columbia, Tenn., for 1907 and 1908.

[Drainage area, 1,260 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	15,400	790	2,790	2.21	2.55	B.
February	14,900	510	2,730	2.17	2.26	B.
March	16,600	650	4,960	3.94	4.54	B.
April	1,240	440	660	.524	.58	A.
May	10,200	475	2,550	2.02	2.33	A.
June	5.410	342	1,350	1.07	1.19	A.
July	7.300	310	1,150	.913	1.05	A.
August	510	170	295	.234	.27	A.
September	5,950	145	668	.530	.59	A.
October	342	100	197	.156	.18	A.
November	4,600	222	1,180	.936	1.04	A.
December	9.460	375	1,820	1.44	1.66	A.
The year	16,600	100	1,700	1.35	18.24	

Monthly discharge of Duck River at Columbia, Tenn., for 1907 and 1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1908.						
January	10,800	790	3,210	2.55	2.94	A.
February	14,100	1,640	5,110	4.06	4.38	B.
March	9,820	1,520	3,440	2.73	3.15	A.
April	7,120	650	1,660	1.32	1.47	A.
May	6,760	685	1,840	1.46	1.68	A.
June	1,990	310	852	.676	.75	A.
July	1,080	195	375	.298	.34	A.
August	2,710	195	509	.404	.47	A.
September	5,140	195	854	.678	.76	A.
October	342	100	189	.150	.17	A.
November	1,440	145	285	.226	.25	A.
December	7,930	408	1,590	1.26	1.45	A.
The year	14,100	100	1,660	1.32	17.81	

MISCELLANEOUS MEASUREMENTS IN OHIO RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in the Ohio River drainage basin during 1907 and 1908:

Miscellaneous measurements in Ohio River basin in 1907 and 1908.

Date.	Stream.	Tributary to	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Sept. 17, 1908	Ohio River	Mississippi River	Henderson, Ky	[a] 3.06	14,500
Aug. 25, 1908	Allegheny River	Ohio River	Suspension bridge, Warren, Pa.	[b] −0.17	886
Do	do	do	Highway bridge, Tionesta, Pa.	(c)	1,030
May 28, 1907	do	do	Aspinwall, Pa	20.5	31,600
Aug. 25, 1908	Conewango Creek	Allegheny River	Fifth street bridge, Warren, Pa.	(d)	226
Do	Brokenstraw Creek	do	First bridge above mouth, about ½ mile, Irvineton, Pa.	(e)	45.3
Do	Tionesta Creek	do	First highway bridge above mouth, Tionesta, Pa.	(f)	58.4
Aug. 24, 1908	Oil Creek	do	Center-street bridge, Oil City, Pa.	(g)	59.2
Do	French Creek	do	Highway bridge, Carlton, Pa.	[h] 0.11	100
Do	Clarion River	do	Highway bridge, Clarion, Pa.	(i)	154
Do	Red Bank Creek	do	Highway bridge, Brookville, Pa.	[b] −0.3	[k] 78.2
Aug. 23, 1908	Mahoning Creek	do	Highway bridge, near mouth, Mahoning, Pa.	(l)	99.0

[a] United States Corps Engineer gage at Evansville, Ind.
[b] Weather Bureau gage.
[c] Reference point is top of guard railing, 58 feet from guard rail post at west end of bridge, downstream side. Distance to water surface, 29.95 feet.
[d] Reference point, top of hand rail opposite end of second panel from left abutment, downstream side of bridge. Distance to water surface, 21.40 feet.
[e] Water surface 13.00 feet below top of coping stone at west end of bridge, upstream side.
[f] Water surface to top of second floor beam from north end, downstream side, was 22.75 feet.
[g] Reference point, top of board walk, downstream side, 30 feet from bend in guard railing at west end of bridge. Distance to water surface, 19.75 feet.
[h] Water supply commission of Pennsylvania gage.
[i] Reference point is top of downstream hand rail, three panels from right end of bridge. Distance to water surface, 33.56 feet.
[k] Discharge includes that of mill race.
[l] Reference point, top of lower chord at south edge of pier, downstream side. Distance to water surface, 27.70 feet.

Miscellaneous measurements in Ohio River basin in 1907 and 1908—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height	Discharge.
				Feet.	*Sec.-ft.*
Nov. 18, 1908	Cheat River	Monongahela River	⅜ mile above bridge at Ice's Ferry, W. Va.	[a] 1.61	131
Dec. 9, 1908	do	do	¼ mile below Uneva cable station, W. Va.	[a] 1.86	223
Aug. 22, 1908	Youghiogheny River	do	Connellsville, Pa	(b)	253
Do	Turtle Creek	do	East Pittsburg, Pa	[c] 0.79	26.4
July 25, 1908	Little Kanawha River	Ohio River	Glenville, W. Va	(d)	112
Aug. 19, 1908	New River	Ohio River	Hinton, W. Va	[e] 1.90	3,490
Sept. 29, 1908	Kanawha River	do	Point Pleasant, W. Va.	(f)	2,130
Sept. 22, 1908	Miami River	do	Hamilton, Ohio	(d)	401
Do	do	do	do	(d)	287
Sept. 23, 1908	do	do	do	(d)	279
Do	do	do	do	(d)	284
Aug. 26, 1907	Savannah Creek	Tuckaseegee River	At mouth, near Dillsboro, N. C.	[g] 0.60	45
Apr. 20, 1907	Soco Creek	Oconolufty River	Cherokee, N. C	[g] 2.22	96
Aug. 27, 1907	do	do	do	[g] 1.76	29
Oct. 19, 1907	do	do	do	[g] 1.78	36
Aug. 24, 1907	Snowbird Creek	Cheoah River	Millsaps, N. C	[g] 1.50	109
Oct. 16, 1907	do	do	do	[g] 1.30	99
May 30, 1907	Tellico River	Little Tennessee River	Tellico Plains, Tenn.	[g] 3.80	211
Aug. 15, 1907	do	do	At wagon bridge, 1 mile above mouth, near McGhee, Tenn.	[g] 3.14	424
Aug. 21, 1907	Fires Creek	Hiwassee River	Near mouth, 15 miles above Murphy, N. C.	[g] 2.56	108
Aug. 22, 1907	Brasstown Creek	do	Near mouth, 7 miles above Murphy, N. C.	[g] 3.07	104
Aug. 17, 1907	Fightingtown Creek	Ocoee River	Near mouth at McCays, Tenn.	[g] 2.80	108

[a] Reference old Cheat River gage at Uneva.
[b] Reference point, top of hand rail beside down spout of gage box at a point 200 feet from edge of pier beside B. & O. R. R. tracks on river side. Distance to water surface, 32.09 feet.
[c] Water supply commission of Pennsylvania gage.
[d] Referenced.
[e] Weather Bureau gage.
[f] Upper gage lock No. 11, 17.40 feet. Lower gage lock No. 11, 6.50 feet.
[g] Gage height determined from reference point.

SUMMARIES OF DISCHARGE PER SQUARE MILE.

The following tables of summaries of discharge per square mile are given to allow of ready comparison of relative rates of run-off from different areas in the Ohio River drainage basin.

They show in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage. But the most important fact worth noting is the almost entire lack of uniformity or agreement between any two stations. It indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, for Ohio River basin for 1907 and 1908.

Station.	Drainage area.	1907. Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	1908. Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Sq. m.																										
Allegheny River at Red House, N. Y.	1,640	3.43	0.61	3.72	2.46	2.32	1.65	1.05	0.18	0.22	1.32	1.04	2.01	1.67	1.83	3.59	6.28	3.55	3.87	1.46	0.79	0.45	0.12	0.09	0.15	0.22	1.87
Allegheny River at Kittanning, Pa	8,690	3.95	1.02	3.96	2.20	2.27	1.82	.85	.24	.36	1.17	1.97	2.46	1.86	2.09	3.37	6.17	2.97	3.87	1.11	1.05	.31	.11	.11	.13	.51	1.82
Kiskiminetas River at Avonmore, Pa.	1,750	....	....	....	....	....	....	1.03	.63	1.36	.97	1.99	2.95	....	3.57	3.37	8.23	3.15	3.47	.65	.34	.20	.05	.06	.08	.41	1.97
Blacklick Creek at Blacklick, Pa.	403	5.66	1.28	6.38	1.62	1.32	1.69	.55	.21	1.20	1.44	1.89	2.63	2.16	2.22	2.63	7.02	2.88	3.90	.70	.50	.24	.04	.06	.10	.75	1.75
Youghiogheny River at Confluence, Pa.	435	9.66	2.85	9.40	2.57	3.36	3.38	3.54	1.57	.87	1.07	3.52	5.15	3.91	3.31	4.71	8.99	3.98	6.34	.77	.36	.27	.09	.07	.09	.34	2.44
Casselman River at Confluence, Pa.	450	7.29	2.27	7.91	2.62	3.62	3.96	1.88	.69	.68	.56	2.67	4.18	3.19	2.84	4.00	7.18	3.64	4.73	.79	.54	.14	.04	.06	.06	.36	2.03
Laurel Hill Creek at Confluence, Pa.	118	7.79	2.13	8.08	3.22	3.77	3.75	2.69	1.29	.84	.84	3.57	4.85	3.57	3.35	4.58	8.73	5.05	5.14	.96	.98	.22	.06	.08	.10	.64	2.49
New River at Radford, Va.	2,720	....	....	....	....	....	3.30	1.30	.92	1.99	.81	1.51	2.18	....	3.10	3.62	2.68	2.44	2.02	1.94	1.65	1.64	1.00	2.21	1.79	2.15	2.19
Greenbrier River at Alderson, W. Va.	1,340	....	....	....	....	....	4.69	1.08	.59	.73	.74	2.57	3.19	....	3.48	4.28	5.81	4.08	3.95	.98	.96	.52	.14	.14	.20	.82	2.11
East Branch White River at Shoals, Ind.	4,900	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.47	....	....	....	....	.08	.09	....
French Broad River near Asheville, N. C.	987	2.39	1.77	1.74	2.04	2.13	1.83	1.11	.78	.85	.56	1.51	2.94	1.64	3.50	4.49	2.96	2.47	2.21	1.37	1.89	2.82	1.60	2.31	1.66	2.22	2.46
French Broad River at Newport, Tenn.	1,740	....	....	....	....	....	....	....	....	1.02	.61	1.29	1.95	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Tennessee River at Knoxville, Tenn.	8,990	1.68	1.35	2.20	1.91	1.58	2.51	1.29	.93	1.15	.68	1.40	1.55	1.52	2.91	2.60	2.97	2.32	1.61	1.17	1.09	1.20	.62	.96	1.05	2.15	1.72
Tennessee River at Chattanooga, Tenn.	21,400	2.22	1.95	2.93	2.21	1.96	2.47	1.25	.99	1.12	.77	1.76	1.61	1.77	3.32	3.26	2.93	2.44	2.10	1.42	1.15	1.18	.72	.59	.85	2.11	1.84
Davidsons River near Davidsons River, N. C.	41	2.46	2.02	2.09	2.19	2.63	2.17	1.47	1.25	2.02	1.08	2.07	4.05	2.12	3.98	5.78	4.02	3.80	3.46	2.49	2.98	4.51	2.68	2.78	2.06	2.59	3.43
North Fork of Mills River at Pinkbed, N. C.	24	3.05	2.37	2.28	2.76	3.60	2.75	1.87	1.40	1.78	1.27	1.90	3.33	2.36	3.52	6.67	3.77	3.78	3.49	2.13	2.71	3.95	2.55	3.72	2.89	3.25	3.54
South Fork of Mills River near Sitton, Tenn.	40.5	3.43	2.62	2.79	2.91	4.07	3.56	2.28	1.65	2.28	1.31	2.67	4.40	2.91	4.52	7.04	4.81	3.88	3.60	2.24	3.38	5.80	3.23	3.38	2.96	3.53	4.03
Pigeon River at Newport, Tenn.	655	1.66	1.48	1.92	1.79	2.09	1.88	1.26	.91	....	....	....	1.71	....	3.37	3.33	3.57	2.20	1.91	1.29	1.39	1.79	.88	1.30	1.28	2.78	2.09
Nolichucky River near Greenville, Tenn.	1,100	1.69	1.25	2.01	1.82	1.53	2.65	1.45	.96	1.31	.85	1.03	1.48	1.50	2.87	2.76	3.26	2.42	2.01	1.44	1.68	1.69	.84	1.77	1.43	2.38	2.05
South Fork of Holston River at Bluff City, Tenn.	828	1.80	1.32	2.42	2.13	1.51	3.97	2.14	1.27	1.68	.98	1.93	2.02	1.93	3.47	2.46	3.27	2.92	2.02	1.49	1.01	.60	.44	.53	.86	2.68	1.81
Holston River near Rogersville, Tenn.	3,060	1.65	1.35	2.33	2.06	1.45	3.37	1.37	1.04	1.47	.79	1.74	1.65	1.69	2.76	2.49	3.09	2.86	1.85	1.57	1.22	.87	.60	.68	.89	2.41	1.77
Watauga River near Elizabethton, Tenn.	408	1.76	1.37	2.45	2.12	1.30	4.12	1.74	1.21	2.52	1.12	1.50	2.97	2.02	4.12	3.50	....	3.31	2.35	1.95	2.60	1.61	.88	1.90	1.49	3.24	....
Little Tennessee River at Judson, N. C.	675	3.47	3.32	3.57	3.11	3.08	3.05	1.90	1.43	1.87	1.33	2.40	3.87	2.70	5.16	6.56	5.33	4.68	3.35	2.16	2.28	2.18	1.39	1.67	1.54	4.41	3.39
Little Tennessee River at McGhee, Tenn.	2,470	2.81	3.03	3.06	2.69	2.81	2.80	1.82	1.27	1.55	1.25	2.30	2.63	2.34	4.01	3.89	4.21	2.98	2.66	1.79	1.81	1.92	1.12	1.03	1.05	2.93	2.45
Tuckaseegee River at Bryson, N. C.	662	2.45	2.55	2.73	2.24	2.66	2.48	1.77	1.30	1.60	1.19	2.24	2.99	2.18	3.41	4.20	4.17	3.34	3.04	1.90	1.86	1.83	1.21	1.18	1.15	2.73	2.50
Hiwassee River at Murphy, N. C.	410	2.66	3.15	2.98	2.51	2.30	2.49	2.31	1.92	2.71	1.33	2.04	2.63	2.42	4.20	4.88	4.71	3.83	3.05	1.68	1.71	1.44	.98	1.06	1.06	3.24	2.65
Hiwassee River at Reliance, Tenn.	1,180	2.87	3.39	2.94	2.40	2.43	2.47	1.94	1.60	1.47	1.22	1.99	2.50	2.27	3.99	3.90	4.21	3.17	2.47	1.63	1.50	1.23	.86	.89	.85	2.82	2.29
Valley River at Tomotla, N. C.	106	4.62	4.42	4.82	2.98	2.85	2.77	1.93	1.44	1.58	1.08	2.38	3.19	2.84	4.58	4.75	5.55	3.57	2.58	1.57	1.44	1.27	.69	.67	.71	3.20	2.55
Ocoee River at McCays, Tenn.	374	2.78	2.97	2.66	2.38	2.29	2.30	1.89	1.60	1.79	1.40	1.86	2.46	2.20	3.40	4.06	3.42	3.42	2.89	1.97	2.05	1.76	1.30	1.13	1.07	2.41	2.41
Elk River near Elkmont, Ala.	1,700	3.15	4.07	5.83	1.05	4.41	1.04	.75	.42	.63	.26	.98	2.07	2.06	3.79	....	....	....	....	....	....	....	....	....	....	....	....
Duck River at Columbia, Tenn.	1,260	2.21	2.17	3.94	.52	2.02	1.07	.91	.23	.53	.16	.94	1.44	1.35	2.55	4.06	2.73	1.32	1.46	.68	.30	.40	.68	.15	.23	1.26	1.32

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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 244

SURFACE WATER SUPPLY OF THE UNITED STATES

1907-8

PART IV. ST. LAWRENCE RIVER BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

H. K. BARROWS, A. H. HORTON
AND R. H. BOLSTER

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SURFACE WATER SUPPLY OF THE ST. LAWRENCE RIVER BASIN, 1907–8.

By H. K. Barrows, A. H. Horton, and R. H. Bolster.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of flow measurements made on certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with organizations mentioned herein. These investigations are authorized by the organic law of the Geological Survey (Stat. L., vol. 20, p. 394), which provides, among other things, as follows:

> Provided that this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

Inasmuch as water is the most abundant and most valuable mineral in nature, the investigation of water resources is included under the above provision for investigating mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the river systems or parts thereof that might purposefully be studied. The scope of the work is limited to that which can be provided with the appropriations available. The field covered and the character of the work are believed to be the best that could be accomplished under the controlling conditions. It would undoubtedly be of more scientific importance and ultimately of more practical value if the money now applied to wide areas were concentrated on a few small basins. Such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be maintained during a period of years sufficient to cover all stages, in order that within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum may be determined. The length of such a period manifestly varies for different streams and can not be absolutely determined. Experience has shown that the records should cover from five to ten years, or for some streams twenty years or more, the limit being determined by the relative importance of the stream and the interdependence of the results and other long-time records on adjacent streams.

In the performance of this work the Geological Survey endeavors to approach as nearly as possible the highest degree of precision which a rational expenditure of time and a judicious expenditure of a small amount of money will allow. In all engineering work there is a point of refinement beyond which it is needless and wasteful to proceed, and this principle applies with especial force to stream-flow measurements. It is confidently believed that with some unavoidable exceptions the stream-flow data presented in the publications of the Survey are sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of many stations. All persons are cautioned to exercise the greatest care in the utilization of such incomplete records.

Records of varying lengths have been obtained at about 1,400 different points in the United States, and in addition the surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, has been investigated. During 1907 and 1908 regular gaging stations were maintained by the Survey and cooperating organizations at about 740 points in the United States, and in addition numerous miscellaneous measurements were made. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country.

These data will be made available in the regular surface water-supply papers and in special papers from time to time.

PURPOSES OF THE WORK.

Among the purposes for which the results contained in this volume are requisite are navigation, irrigation, domestic water supply, water power, swamp and overflow land drainage, and flood prevention. The demands of all these interests are immediate.

Navigation.—The Federal Government has expended more than $250,000,000 for the improvement of inland navigation, and prospective expenditures will approximate several times this amount. It is obvious that the determination of stream flow is necessary to the intelligent solution of the many problems involved.

Irrigation.—The United States is now expending $42,000,000 on federal irrigation systems, and this amount is far exceeded by the private expenditures of this nature in the arid West. The integrity of any irrigation system is based absolutely on the amount of water available. Therefore investigations of stream flow in that portion of the country are of first importance in the redemption of the lands, as well as constituting an insurance of federal and private investments.

Domestic water supply.—The highest use of water is that of domestic supply, and, while the federal interest in this aspect of the matter is less direct than in the aspects already named, this use of water nevertheless has so broad a significance with respect to the general welfare that the Federal Government is ultimately and intimately concerned.

Water power.—The time is rapidly approaching when the development of the water power of the country will be an economic necessity. Our stock of coal is being rapidly depleted, and the cost of steam power is increasing accordingly. Industry will cease its growth if cheap power is not available, and in that event the United States as a nation will cease to progress. Water power is the only avenue now open. When the electric transmission of power was accomplished the relation of our water powers to national economy changed entirely. Previous to the day of electric transmission the importance of a water power was largely confined to the locality at which it was generated, but it has now become a public utility in which the individual citizen is vitally interested. Inasmuch as the amount of water power that may be made available is dependent on the flow of rivers, the investigation of flow becomes a prerequisite in the judicious management of this source of energy.

Drainage of swamp and overflowed lands.—More than 70,000,000 acres of the richest land in this country are now practically worthless, or of precarious value, by reason of overflow and swamp

conditions. When this land is drained it becomes exceedingly productive and its value increases many fold. Such reclamation would add to the national assets at least $700,000,000. The study of run-off is the first consideration in connection with drainage projects. If, by the drainage of a large area into any particular channel that channel becomes so gorged with water which it had not hitherto been called upon to convey that overflow conditions are created in places where previously the land was not subject to inundation, then drainage results merely in an exchange of land values. This is not the purpose of drainage improvement.

Flood prevention.—The damage from floods in the United States exceeds $100,000,000 annually and in the year 1908 the aggregate damage, based on reliable data, approximated $250,000,000. Such an annual tax on the property of great regions should be reduced in the orderly progress of government. It goes without saying that any consideration of flood prevention must be based on a thorough knowledge of stream flow, both in the contributing areas which furnish the water and along the great lowland rivers.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey since its inception have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications have varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1907 and 1908. The dividing line between the North Atlantic and South Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1907–8.

Part.	No.	Title.	Part.	No.	Title.
I	241	North Atlantic coast.	VI	246	Missouri River basin.
II	242	South Atlantic coast and eastern Gulf of Mexico.	VII	247	Lower Mississippi River basin.
III	243	Ohio River basin.	VIII	248	Western Gulf of Mexico.
IV	244	St. Lawrence River basin.	IX	249	Colorado River basin.
V	245	Upper Mississippi River and Hudson Bay basins.	X	250	Great Basin.
			XI	251	California.
			XII	252	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey exclusive of all special papers. Numbers of reports are inclusive and dates also are inclusive so far as the data are available.

Stream-flow data in reports of the United States Geological Survey.

[Ann.=Annual Report; B.=Bulletin; W. S.=Water-Supply Paper.]

Report.	Character of data.	Year.
10th Ann., pt. 2	Descriptive information only	
11th Ann., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th Ann., pt. 2	do	1884 to June 30, 1891.
13th Ann., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th Ann., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th Ann., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W. S. 11	Gage heights (also gage heights for earlier years)	1896.
18th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896.
W. S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W. S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th Ann., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W. S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W. S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th Ann., pt. 4	Monthly discharge (also for many earlier years)	1898.
W. S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st Ann., pt. 4	Monthly discharge	1899.
W. S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d Ann., pt. 4	Monthly discharge	1900.
W. S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W. S. 75	Monthly discharge	1901.
W. S. 82 to 85	Complete data	1902.
W. S. 97 to 100	do	1903.
W. S. 124 to 135	do	1904.
W. S. 165 to 178	do	1905.
W. S. 201 to 214	Complete data, except descriptions	1906.
W. S. 241 to 252	Complete data	1907–8.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119. The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1908. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1908.

	1899.[a]	1900.[b]	1901.	1902.	1903.	1904.	1905.	1906.	1907–8
Atlantic coast and eastern Gulf of Mexico:									
New England rivers	35	47	65, 75	82	97	124	165	201	241
Hudson River to Delaware River, inclusive	35	47,(48)	65, 75	82	97	125	166	202	241
Susquehanna River to York River, inclusive	35	48	65, 75	82	97	126	167	203	241
James River to Yadkin River, inclusive	(35), 36	48	65, 75	(82), 83	(97), 98	126	167	203	242
Santee River to Pearl River, inclusive	36	48	65, 75	83	98	127	168	204	242
St. Lawrence River	36	49	65, 75	(82), 83	97	129	170	206	244
Hudson Bay	.....	.....	66, 75	85	100	130	171	207	245
Mississippi River:									
Ohio River	36	48, (49)	65, 75	83	98	128	169	205	243
Upper Mississippi River	36	49	65, 75	83	98, (99)	128, (130)	171	207	245
Missouri River	(36), 37	49, (50)	66, 75	84	99	130, (131)	172	208	246
Lower Mississippi River	37	50	(65), 66, 75	(83), 84	(98), 99	(128), 131	(169), 173	(205), 209	247
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248
Pacific coast and Great Basin:									
Colorado River	(37), 38	50	66, 75	85	100	133, (134)	175, (177)	211, (213)	249, (251)
Great Basin	38, (39)	51	66, 75	85	100	133, (134)	176, (177)	212, (213)	250, (251)
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100	134	177	213	251
North Pacific coast	38	51	66, 75	85	100	135	(177), 178	214	252

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
33	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	All stations in Colorado and Great Basin drainages lying in California repeated.
	Great Basin	

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined on the basis of drainage area, local changes in name and lake surface being

disregarded. After all stations from the source to the mouth of the main stem of the river have been given, the tributaries are taken up in regular order from source to mouth. The tributaries are treated the same as the main stream, all stations in each tributary basin being given before taking up the next one below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is often clearer to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups: (1) Those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Gallons per minute" is generally used in connection with pumping and city water supply.

The "miner's inch" is the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It is commonly used by miners and irrigators throughout the West and is defined by statute in each State in which it is used.

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of March 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equal 18.7 United States gallons per second.
100 California miner's inches equal 96.0 Colorado miner's inches.
100 California miner's inches for one day equal 4.96 acre-feet.
100 Colorado miner's inches equal 2.60 second-feet.
100 Colorado miner's inches equal 19.5 United States gallons per second.
100 Colorado miner's inches equal 104 California miner's inches.
100 Colorado miner's inches for one day equal 5.17 acre-feet.
100 United States gallons per minute equal 0.223 second-feet.
100 United States gallons per minute for one day equal 0.442 acre-foot.
1,000,000 United States gallons per day equal 1.55 second-feet.
1,000,000 United States gallons equal 3.07 acre-feet.
1,000,000 cubic feet equal 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.

$1\frac{1}{3}$ horsepower equal about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF TABLES.

For each drainage basin there is given a brief description of general conditions covering such features as area, source, tributaries, topography, geology, conditions of forestation, rainfall, ice conditions, irrigation, storage, power possibilities, and other special features of importance or interest.

For each regular current-meter gaging station are given in general, and so far as available, the following data: Description of station, list of discharge measurements, table of daily gage heights, rating table, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage height and rating tables are omitted and a table of daily discharge is substituted. For stations where the flow is computed by shifting-channel methods, a table of daily discharge is given in place of rating tables, which are not used in these methods of computation.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting conditions of flow, and backwater; also full information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights gives the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights during ice conditions, backwater from obstructions, etc., are published as recorded, with suitable footnotes. The rating is not applicable for such periods unless the proper correction to the gage heights is known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which the rating tables and monthly-discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is published to enable engineers to determine the daily discharge by its application to the table of gage heights or to check results in the table of monthly discharge.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the period when the water surface was at crest height and the corresponding discharge consequently larger than given in this column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 13, are based.

FIELD METHODS OF MEASURING STREAM FLOW.

There are three distinct methods of determining the flow of open-channel streams: (1) By measurements of slope and cross section and the use of Chezy's and Kutter's formulas; (2) by means of a weir or dam; (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen depends on the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

Slope method.—Much information has been collected relative to the coefficients to be used in the Chezy formula, $v=c\sqrt{Rs}$. This has been utilized by Kutter, both in developing his formula for c and in determining the values of the coefficient n which appears therein. The results obtained by the slope method are in general only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value for n to be used in Kutter's formula. The most common use of this method is in estimating the flood discharge of a stream when the only data available are the cross section, the slope as shown by marks along the bank, and a knowledge of the general conditions. It is seldom used by the United States Geological Survey. For full information regarding this method the reader is referred to the various text-books on hydraulics.

Weir method.—Relatively few stations are maintained at weirs or dams by the United States Geological Survey. Standard types of

sharp-crested and broad-crested weirs within the limits for which accurate coefficients have been experimentally obtained give very accurate records of discharge if properly maintained. At practically all broad-crested weirs, however, there is a diversion of water either through or around the dam, usually for the purpose of development of water power. The flow is often complicated, and the records are subject to errors from such sources as leakage through the dam, backwater at high stages, uncertainty regarding coefficient, crest which is not level, obstructions from logs or ice, use of flashboards, old turbines with imperfect ratings, and many others depending on the type of development and the uses of the diverted water.

In general, records of discharge at dams are usually accurate enough for practical use if no others are available. It has been the general experience of the United States Geological Survey, however, that records at current-meter gaging stations under unobstructed channel conditions are more accurate than those collected at dams, and where the conditions are reasonably favorable are practically as good as those obtained at sharp-crested weirs.

The determination of discharge over the different types of weirs and dams is treated fully in "Weir experiments, coefficients, and formulas" (Water-Supply Paper 200[a]) and in the various text-books on hydraulics. "Turbine water-wheel tests and power tables" (Water-Supply Paper 180) treats of the discharge through turbines when used as meters. The editions of both of these water-supply papers are practically exhausted. They can, however, be consulted at most of the larger libraries of the country, or they can be obtained from the Superintendent of Documents, Washington, D. C., at a cost of 20 cents for No. 180 and 35 cents for No. 200. Remittances must be made by postal money order, express order, or New York draft.

Velocity method.—Streams in general present throughout their courses, to a greater or less extent, all conditions of permanent, semi-permanent, and varying conditions of flow. In accordance with the location of the measuring section with respect to these physical conditions, current-meter gaging stations may in general be divided into four classes—(1) those with permanent conditions of flow; (2) those with beds which change only during extreme high water; (3) those with beds which change frequently but which do not cause a variation of more than about 5 per cent of the discharge curves from year to year; and (4) those with constantly shifting beds. In determining the daily flow different office methods are necessary for each class. The field data on which the determinations are based and the methods of collecting them are, however, in general the same.

[a] Water-Supply Paper 200 is a revision of No. 150, the edition of which is exhausted.

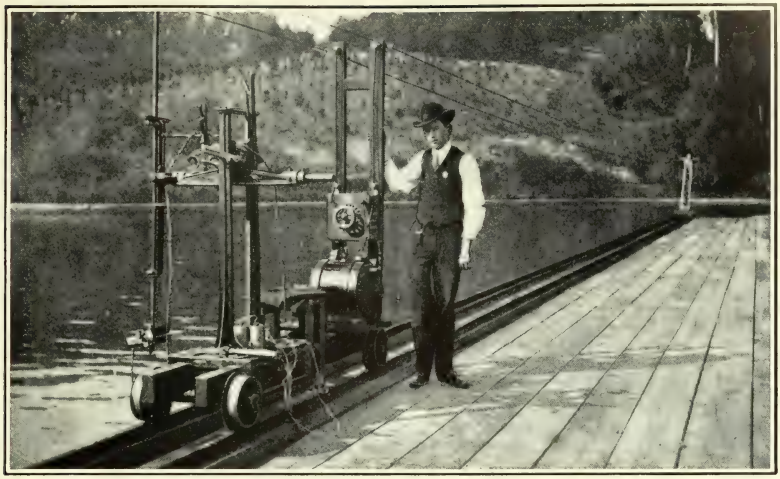
Great care is taken in the selection and equipment of gaging stations for determining discharge by velocity measurements, in order that the data may have the required degree of accuracy. They are located, as far as possible, at such points that the relation between gage height and discharge will always remain constant for any given stage. The experience of engineers of the Geological Survey has been that permanency of conditions of flow is the prime requisite of any current-meter gaging station when maintained for several years unless funds are available to cover all changes in conditions of flow. A straight, smooth section without cross currents, backwater, boils, etc., at any stage is highly desirable, but on most streams is not attainable except at the cost of a cable equipment. Rough, permanent sections, if measurements are properly made by experienced engineers, taking measuring points at a distance apart of 2 to 5 per cent or less of the total width, will within reasonable limits yield better results for a given outlay of money than semi-permanent or shifting sections with smooth, uniform current. So far as possible stations are located where the banks are high and not subject to overflow at high stages and out of the influence of tributary streams, dams, or other artificial obstructions which might affect the relation between gage height and discharge.

A gaging station consists essentially of a gage for determining the daily fluctuations of stage of the river and some structure or apparatus from which discharge measurements are made, usually a bridge or cable.

The two factors required to determine the discharge of a stream past a section perpendicular to the mean direction of the current are the area of the cross section and the mean velocity of flow normal to that section.

In making a measurement with a current meter a number of points, called measuring points, are measured off above and in the plane of the measuring section at which observations of depth and velocity are taken. (See Pl. I, *B*.) These points are spaced equally for those parts of the section where the flow is uniform and smooth and are spaced unequally for other parts, according to the discretion and judgment of the engineer. In general the points should not be spaced farther apart than 5 per cent of the distance between piers, nor farther apart than the approximate mean depth of the section at the time of measurement.

The measuring points divide the total cross section into elementary strips at each end of which observations of depth and velocity are made. The discharge of any elementary strip is the product of the average of the depths at the two ends times the width of the strip times the average of the mean velocities at the two ends of the strip. The sum of the discharges of the elementary strips is the total



A. CURRENT-METER RATING STATION AT LOS ANGELES, CAL.

B. BRIDGE STATION AND CROSS SECTION OF STREAM.

Illustrating 0.2 and 0 8 depth method.

discharge of the stream. (For a discussion of methods of computing the discharge of a stream see Engineering News, June 25, 1908.)

Depths for the determination of the area are usually obtained by sounding with the current meter and cable. In rough sections or swift current an ordinary weight and cable are used, particular care being taken that all observations shall be in the plane of the cross section.

Two methods of determining the velocity of flow of a stream are in general use—the float method and the current-meter method.

The float method with its various modifications of surface, subsurface, and tube or rod floats is now considered obselete in the ordinary practice of the United States Geological Survey. The use of this method is limited to special conditions where it is impracticable to use the current meter, such as in places where large quantities of ice or débris which may damage the meter are flowing with the current, and for miscellaneous measurements or other work where a high degree of accuracy is not necessary. Tube floats are very satisfactory for use in canals with regular bottoms and even flow of current. Measurements by the float method are made as follows: The velocity of flow of the stream is obtained by observing the time which it takes floats set free at different points across the stream to pass between two range lines about 200 feet apart. The area used is the mean value obtained from several cross sections measured between the two range lines. The chief disadvantages of this method are difficulty in obtaining the correct value of mean area for the course used and uncertainty regarding the proper coefficient to apply to the observed velocity. For further information regarding this method the reader is referred to Water-Supply Paper 95 and to the various text-books covering the general subject of stream flow.

The Price current meter is now used almost to the exclusion of other types of meters by the United States Geological Survey in the determination of the velocity of flow of water in open channels, a use for which it is adapted under practically all conditions. Plate II shows in the center the new type of penta-recording current meter equipped for measurements at bridge and cable stations. On the sides of the same type of meter is shown equipped for wading measurements to record by the acoustic method on the left and by the electric method on the right. Briefly, the meter consists of six cups attached to a vertical shaft which revolves on a conical hardened steel point when immersed in moving water. The number of revolutions is indicated electrically. The rating, or relation between the velocity of the moving water and the revolutions of the wheel, is determined for each meter by drawing it through still water for a given distance at different speeds and noting the number of revolutions for each run. (See Pl. I, *A*.) From these data a rating table is prepared

which gives the velocity per second of moving water for any number of revolutions in a given time interval. The ratio of revolutions per second to velocity of flow in feet per second is very nearly a constant for all speeds and is approximately 0.45.

Three classes of methods of measuring velocity with current meters are in general use—multiple-point, single-point, and integration.

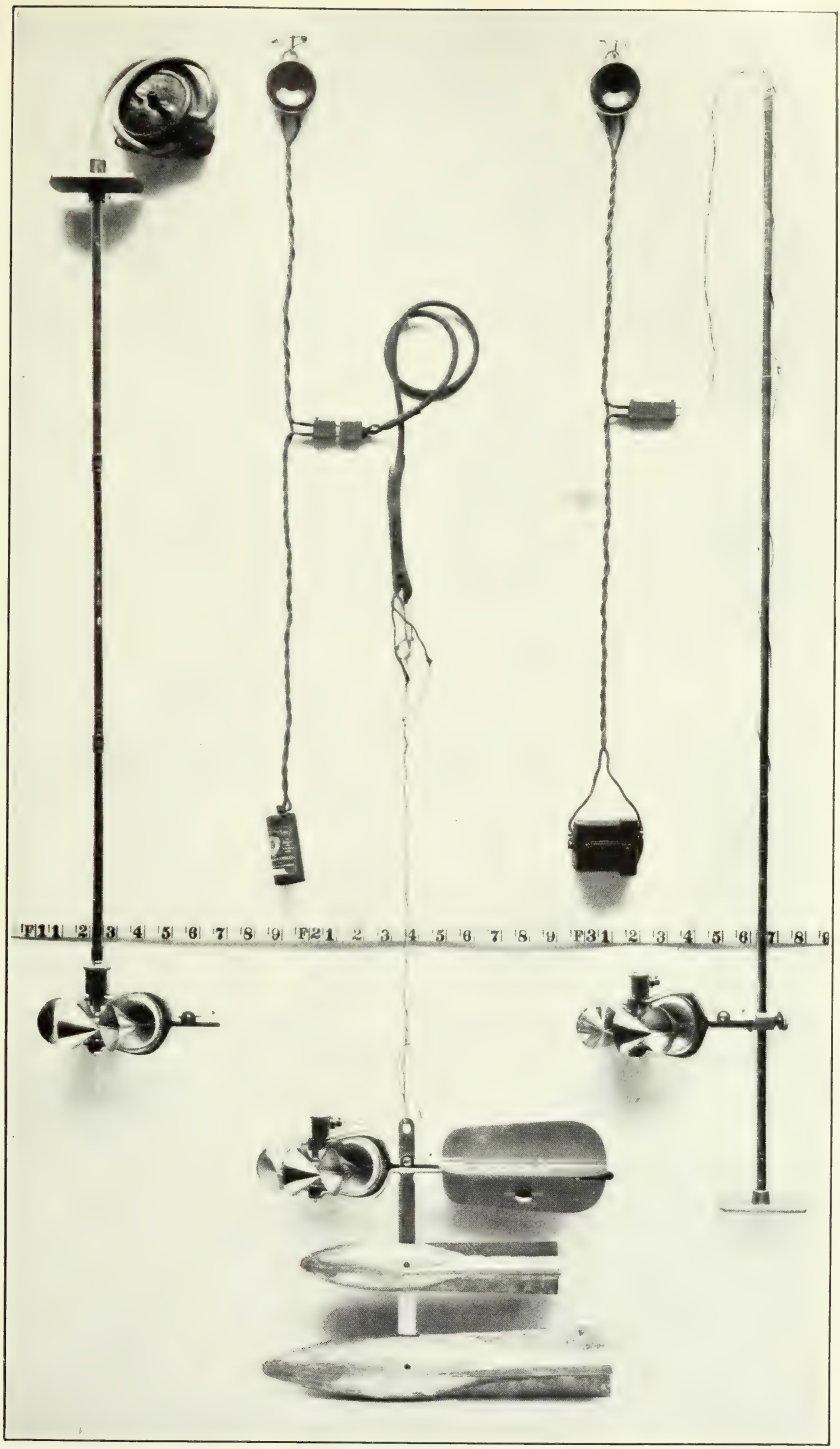
The two principal multiple-point methods in general use are the vertical velocity curve and 0.2 and 0.8 depth.

In the vertical velocity curve method a series of velocity determinations are made in each vertical at regular intervals, usually about 10 to 20 per cent of the depth apart. By plotting these velocities as abscissas and their depths as ordinates and drawing a smooth curve among the resulting points, the vertical velocity curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the area bounded by this velocity curve and its axis by the depth. This method of obtaining the mean velocity in the vertical is probably the best known, but on account of the length of time required to make a complete measurement its use is largely limited to the determination of coefficients for purposes of comparison and to measurements under ice.

In the second multiple-point method the meter is held successively at 0.2 and 0.8 depth, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. (See Pl. I, *B*.) On the assumption that the vertical velocity curve is a common parabola with horizontal axis, the mean of the velocities at 0.22 and 0.79 depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this multiple-point method gives the mean velocity very closely for open-water conditions and that in a completed measurement it seldom varies as much as 1 per cent from the value given by the vertical velocity curve method. Moreover, the indications are that it holds nearly as well for ice-covered rivers. It is very extensively used in the regular practice of the United States Geological Survey.

The single-point method consists in holding the meter either at the depth of the thread of mean velocity or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined or must be assumed.

Extensive experiments by means of vertical velocity curves show that the thread of mean velocity generally occurs between 0.5 and 0.7 total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and at this point the meter is held in most of the measurements made by the single-point method. A large number of vertical velocity curve measurements, taken on



PRICE PENTA-RECORDING CURRENT METERS.

many streams and under varying conditions, show that the average coefficient for reducing the velocity obtained at 0.6 depth to mean velocity is practically unity. The variation of the coefficient from unity in individual cases is, however, greater that in the 0.2 and 0.8 method and the general results are not as satisfactory.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocity taken at the subsurface to the mean has been found to be in general from about 0.85 to 0.95, depending on the stage, velocity, and channel conditions. The higher the stage the larger the coefficient. This method is especially adapted for flood measurements, or when the velocity is so great that the meter can not be kept in the correct position for the other methods.

The vertical integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is useful as a check on the point methods. In using the Price meter great care should be taken that the vertical movement of the meter is not rapid enough to vitiate the accuracy of the resulting velocity.

The determination of the flow of an ice-covered stream is difficult, owing to diversity and instability of conditions during the winter period and also to lack of definite information in regard to the laws of flow of water under ice. The method now employed is to make frequent discharge measurements during the frozen periods by the 0.2 and 0.8 and the vertical velocity curve methods, and to keep an accurate record of the conditions, such as the gage height to the surface of the water as it rises in a hole cut in the ice, and the thickness and character of the ice. From these data an approximate estimate of the daily flow can be made by constructing a rating curve (really a series of curves) similar to that used for open channels, but considering, in addition to gage heights and discharge, the varying thickness of ice. For information in regard to flow under ice cover, see Water-Supply Paper 187.

OFFICE METHODS OF COMPUTING AND STUDYING DISCHARGE AND RUN-OFF.

At the end of each year the field or base data for current-meter gaging stations, consisting of daily gage heights, discharge measurements, and full notes, are assembled. The measurements are plotted on cross-section paper and rating curves are drawn wherever feasible.

The rating tables prepared from these curves are then applied to the tables of daily gage heights to obtain the daily discharges, and from these applications the tables of monthly discharge and run-off are computed.

Rating curves are drawn and studied with special reference to the class of channel conditions which they represent. (See p. 17.) The discharge measurements for all classes of stations when plotted with gage heights in feet as ordinates and discharges in second-feet as abscissas define rating curves which are more or less generally parabolic in form. In many cases curves of area in square feet and mean velocity in feet per second are also constructed to the same scale of ordinates as the discharge curve. These are used mainly to extend the discharge curves beyond the limits of the plotted discharge measurements, and for checking purposes to avoid errors in the form of the discharge curve and to determine and eliminate erroneous measurements.

For every published rating table the following assumptions are made for the period of application of the table: (*a*) That the discharge is a function of and increases gradually with the stage; (*b*) that the discharge is the same whenever the stream is at a given stage, and hence such changes in conditions of flow as may have occurred during the period of application are either compensating or negligible, except that the rating as stated in the footnote of each table is not applicable for known conditions of ice, log jams, or other similar obstructions; (*c*) that the increased and decreased discharge due to change of slope on rising and falling stages is either negligible or compensating.

As already stated, the gaging stations may be divided into several classes, as indicated in the following paragraphs:

The stations of class 1 represent the most favorable conditions for an accurate rating and are also the most economical to maintain. The bed of the stream is usually composed of rock and is not subject to the deposit of sediment and loose material. This class includes also many stations located in a pool below which is a permanent rocky riffle that controls the flow like a weir. Provided the control is sufficiently high and close to the gage to prevent cut and fill at the gaging point from materially affecting the slope of the water surface, the gage height will for all practical purposes be a true index of the discharge. Discharge measurements made at such stations usually plot within 2 or 3 per cent of the mean-discharge curve, and the rating developed from that curve represents a very high degree of accuracy. For illustrative example of a station of this type see figure 1 and Water-Supply Paper 241.

Class 2 is confined mainly to stations on rough mountainous streams with steep slopes. The beds of such streams are, as a rule,

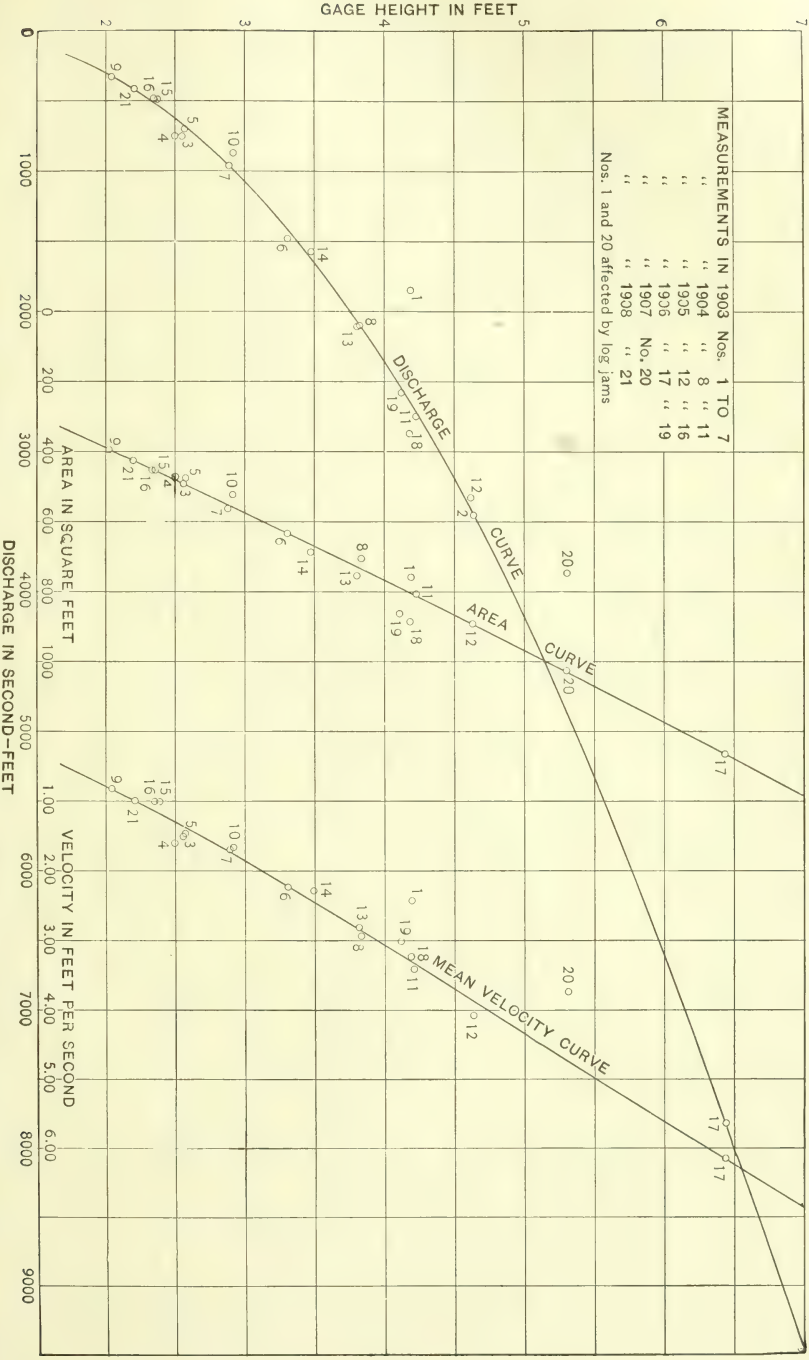


FIGURE 1.—Discharge, area, and mean velocity curves of Escanaba River near Escanaba, Mich.

comparatively permanent during low and medium stages, and when the flow is sufficiently well defined by an adequate number of discharge measurements before and after each flood the stations of this class give nearly as good results as those of class 1. As it is seldom possible to make measurements covering the time of change at flood stage, the assumption is often made that the curves before and after the flood converged to a common point at the highest gage height recorded during the flood. Hence the only uncertain period occurs during the few days of highest gage heights covering the period of actual change in conditions of flow. For illustrative examples of stations of this type see Water-Supply Paper 246.

Class 3 includes most of the current-meter gaging stations maintained by the United States Geological Survey. If sufficient measurements could be made at stations of this class results would be obtained nearly equaling those of class 1, but owing to the limited funds at the disposal of the Survey this is manifestly impossible, nor is it necessary for the uses to which discharge data are applied. The critical points are as a rule at relatively high or low stages. The percentage error, however, is greater at low stages. No absolute rule can be laid down for stations of this class. Each rating curve must be constructed mainly on the basis of the measurements of the current year, the engineer being guided largely by the past history of the station and the following general law: If all measurements ever made at a station of this class are plotted on cross-section paper, they will define a mean curve which may be called a standard curve. It has been found in practice that if after a change caused by high stage, a relatively constant condition of flow occurs at medium and low stages, all measurements made after the change will plot on a smooth curve which is practically parallel to the standard curve with respect to their ordinates, or gage heights. This law of the parallelism of ratings is the fundamental basis of all ratings and estimates at stations with semipermanent and shifting channels. It is not absolutely correct, but, with few exceptions, answers all the practical requirements of estimates made at low and medium stages after a change at a high stage. This law appears to hold equally true whether the change occurs at the measuring section or at some controlling point below. The change is of course fundamentally due to change in the channel caused by cut or fill, or both, at and near the measuring section. For all except small streams the changes in section usually occur at the bottom. The following simple but typical examples illustrate this law:

(*a*) If 0.5 foot of planking were to be nailed on the bottom of a well-rated wooden flume of rectangular section, there would result, other conditions of flow being equal, new curves of discharge, area, and velocity, each plotting 0.5 foot above the original curves when

referred to the original gage. In other words, this condition would be analogous to a uniform fill or cut in a river channel which either reduces or increases all three values of discharge, area, and velocity for any gage height. In practice, however, such ideal conditions rarely exist.

(*b*) In the case of a cut or fill at the measuring section there is a marked tendency toward decrease or increase, respectively, of the velocity. In other words, the velocity has a compensating effect and if the compensation is exact at all stages, the discharge at a given stage will be the same under both the new and the old conditions.

(*c*) In the case of uniform change along the crest of a weir or rocky controlling point, the area curve will remain the same as before the change, and it can be shown that here again the change in velocity curve is such that it will produce a new discharge curve essentially parallel to the original discharge curve with respect to their ordinates.

Of course, in actual practice such simple changes of section do not occur. The changes are complicated and lack uniformity, a cut at one place being largely offset by a fill at another and vice versa. If these changes are very radical and involve large percentages of the total area—as, for example, on small streams—there may result a wide departure from the law of parallelism of ratings. In complicated changes of section the corresponding changes in velocity which tend to produce a new parallel discharge curve may interfere with each other materially, causing eddies, boils, backwater, and radical changes in slope. In such extreme conditions, however, the measuring section would more properly fall under class 4 and would require very frequent measurements of discharge. Special stress is laid on the fact that in the lack of other data to the contrary the utilization of this law will yield the most probable results.

Slight changes at low or medium stages of an oscillating character are usually averaged by a mean curve drawn among them parallel to the standard curve, and if the individual measurements do not vary more than 5 per cent from the rating curve the results are considered good for stations of this class. For illustrative example see Water-Supply Paper 242.

Class 4 comprises stations that have soft, muddy, or sandy beds. Good results can be obtained from such sections only by frequent discharge measurements, the frequency varying from a measurement every two or three weeks to a measurement every day, according to the rate of diurnal change in conditions of flow. These measurements are plotted and a mean or standard curve drawn among them. It is assumed that there is a different rating curve for every day of the year and that this rating is parallel to the standard curve with respect to their ordinates. On the day of a

measurement the rating curve for that day passes through that measurement. For days between successive measurements it is assumed that the rate of change is uniform, and hence the ratings for the intervening days are equally spaced between the ratings passing through the two measurements. This method must be modified or abandoned altogether under special conditions. Personal judgment and a knowledge of the conditions involved can alone dictate the course to pursue in such cases. For illustrative example of a station of this type, showing the Bolster method of determining the daily discharge graphically, see Water-Supply Papers 247 and 249.

The computations have, as a rule, been carried to three significant figures. Computation machines, Crelle's tables, and the 20-inch slide rule have been generally used. All computations are carefully checked.

After the computations have been completed they are entered in tables and carefully studied and intercompared to eliminate or account for all gross errors so far as possible. Missing periods are filled in, so far as is feasible, by means of comparison with adjacent streams. The attempt is made to complete years or periods of discharge, thus eliminating fragmentary and disjointed records. Full notes accompanying such estimates follow the monthly discharge tables.

For most of the northern stations estimates have been made of the monthly discharge during frozen periods. These are based on measurements under ice conditions wherever available, daily records of temperature and precipitation obtained from the United States Weather Bureau climate and crop reports, observers' notes of conditions, and a careful and thorough intercomparison of results with adjacent streams. Although every care possible is used in making these estimates they are often very rough, the data for some of them being so poor that the estimates are liable to as much as 25 to 50 per cent error. It is believed, however, that estimates of this character are better than none at all, and serve the purpose of indicating in a relative way the proportionate amount of flow during the frozen period. These estimates are, as a rule, included in the annual discharge. The large error of the individual months has a relatively small effect on the annual total, and it is for many purposes desirable to have the yearly discharge computed even though some error is involved in doing so.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are

largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous tests and experiments have been made to test the accuracy of current-meter work. These show that it compares very favorably with the results from standard weirs, and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where uncertainty regarding the coefficient and complicated conditions of flow prevail.

The work is, of course, dependent on the reliability of the observers. With relatively few exceptions, the observers perform their work honestly. Care is taken, however, to watch them closely and to inquire into any discrepancies. It is, of course, obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the rating tables and an accuracy column is inserted in the monthly discharge table. In the rating tables "well defined" indicates in general that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

In general, the policy is followed of making available for the public the base data which are collected in the field each year by the Survey engineers. This is done to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to

year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the data given in these papers will verify all ratings and make such adjustments in earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for five or ten year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The values in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates. This is particularly true of the maximum and minimum figures, which in the very nature of the method of collecting these data are liable to large errors. The maximum value should be increased considerably for many stations in considering designs for spillways, and the minimum value should be considered for a group of, say, seven days and not for one day.

The rating table, provided the engineer accepts it, is published primarily to allow him to apply it directly to the daily gage heights and rearrange the daily discharges in order of magnitude or by some other method.

COOPERATION AND ACKNOWLEDGMENTS.

LAKE MICHIGAN, LAKE HURON, AND LAKE ERIE DRAINAGES.

Assistance has been rendered or records furnished by the following persons, to whom special acknowledgment is due: D. W. Mead, Madison, Wis.; Gardiner S. Williams, Ann Arbor, Mich.; L. W. Anderson, city engineer, Grand Rapids, Mich.; Washtenaw Light and Power Company, Ann Arbor, Mich.; Fletcher Paper Company, Alpena, Mich.; Commonwealth Power Company, Jackson, Mich.; Flint Land Company, Flint, Mich.

LAKE HURON AND ST. LAWRENCE RIVER DRAINAGES.

Assistance has been rendered or records furnished by the following, to whom special acknowledgment is due: Fredrick Skene, state engineer, and William R. Hill, special deputy state engineer, representing New York state cooperation; State Water Supply Commission of New York, Hon. Henry H. Persons, president; E. A. Fisher, city engineer, and John F. Skinner, principal assistant city engineer, Rochester, N. Y.; West Virginia Pulp and Paper Company, Mechanicville, N. Y.; United States Army Engineers; Plattsburg Gas and Electric Company, Plattsburg, N. Y; Albany and Hudson Railroad Company, Albany, N. Y.; Charles H. Cooke, New York City; Consolidated Water Company, Utica, N. Y.; George Beebe, deputy city engineer, Syracuse, N.Y.

DIVISION OF WORK.

The field data in Lake Michigan, Lake Huron, and Lake Erie drainages were collected under the direction of L. S. Smith and A. H. Horton, district engineers, assisted by G. A. Gray, William M. O'Neill, and Max Chapman.

The ratings, special estimates, and studies of the completed data were made by A. H. Horton and R. H. Bolster. The computations and the preparation of the completed data for publication were made under the direction of R. H. Bolster, assistant engineer, assisted by H. D. Padgett, G. C. Stevens, G. L. Parker, R. C. Rice, J. G. Mathers, and M. I. Walters.

The field data for New York were collected under the direction of H. K. Barrows, district engineer, assisted by D. M. Wood, assistant engineer, and G. M. Brett, C. R. Adams, R. A. Mention, and H. F. French.

Except as otherwise stated in the descriptions, all ratings, computations, and special studies prepared in advance for the State Water Supply Commission of New York and some few other stations in New York were made by H. K. Barrows. All other ratings, ice estimates, special estimates, and computations for New York were made and prepared for publication by R. H. Bolster, assistant engineer, assisted by H. D. Padgett, G. C. Stevens, and M. I. Walters.

The completed manuscript for New York was reviewed by H. K. Barrows and C. C. Covert. The complete manuscript was edited by Mrs. B. D. Wood.

LAKE MICHIGAN DRAINAGE BASIN.

GENERAL FEATURES.

The Lake Michigan drainage basin comprises a comparatively narrow strip of flat or gently rolling land in eastern Wisconsin, on the west shore of the lake, and a much wider strip of nearly the same character in Michigan, on the east shore. The principal streams entering the lake from the west are Fox and Menominee rivers; from the east, St. Joseph, Kalamazoo, Grand, Muskegon, and Manistee rivers.

The following pages give the results of data collected during 1907 and 1908 in the Lake Michigan drainage basin.

ESCANABA RIVER DRAINAGE BASIN.

DESCRIPTION.

Escanaba River rises in the western part of Marquette County, near Lake Michigamme, and takes a generally southeasterly direction to Little Bay de Noquette, an arm of Lake Michigan, which it enters near Escanaba, Mich. Its length is about 90 miles, and its drainage area, which lies in the central part of the Northern Peninsula of Michigan,

comprises about 890 square miles. The tributaries of the river are small, the West Branch being the only one of importance. The basin is long and narrow and comparatively regular in outline, the average width of its lower half being less than 10 miles, its extreme width about 25 miles, and its length about 70 miles.

In its upper course the river flows through an area of crystalline rocks, but farther down the rocks are sandstones and limestones. The headwaters of the river have an elevation of about 1,600 feet above sea level, and at its mouth the elevation is 580 feet, making a total descent of about 1,000 feet, or an average fall of over 10 feet to the mile.

The greater part of the best timber has been cut off, but lumbering is yet an active industry. The change in the forest conditions has probably not affected the run-off of the stream. The river is still used quite extensively for logging.

The mean annual rainfall in this part of Michigan is about 32 inches. The winters are severe; the snowfall is heavy and lasts for considerable periods, and ice covers the streams to a thickness of 2 feet from three to four months.

Storage possibilities have not been investigated, but suitable locations for reservoirs could doubtless be found in the drainage basin, as it contains some lakes and swamps.

Little is known of the water-power possibilities, but as the average fall is high favorable sites must be numerous. A few power sites not far from the mouth of the river have been developed, and at least one of these the plant is of recent installation.

ESCANABA RIVER NEAR ESCANABA, MICH.

The only station maintained in this river basin is that on the Escanaba, at Escanaba, Mich., 1903–1908, described below.

This station, which is located at a highway bridge between Escanaba, Mich., and Gladstone, Mich., about 9 miles north of Escanaba, Mich., and 4 miles above the mouth of the river, was established August 25, 1903, to obtain data applicable to water-power and water-supply problems, as well as general statistical and comparative data. Discharge measurements were made at this station in April, May, and July, 1903, but daily gage heights were not obtained until August 25, 1903.

Although the current is swift at the measuring section, gage heights are affected by ice, which in some years covers the stream to a depth of 2 feet for four months, and during the logging season the gage heights are sometimes affected by log jams.

The datum of the gage has remained unchanged. Except as noted above the records are reliable and accurate, and a good rating curve has been developed. (See fig. 1, p. 23.)

Discharge measurements of Escanaba River near Escanaba, Mich., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907. May 7[a]	Horton and Gray	194	1,030	5.30	3,890
1908. July 16	G. A. Gray	194	426	2.20	416

[a] Discharge plots low; probably affected by log jam.

Daily gage height, in feet, of Escanaba River near Escanaba, Mich., for 1907 and 1908.

[Observer, Felix Beauchamp.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	4.4	4.2	4.0	2.5	2.1	2.4	3.0	2.3	2.3
2	.....	.....	.....	4.3	4.4	3.8	2.5	2.1	2.5	2.9	2.4	2.3
3	.....	.....	.....	4.3	4.6	3.8	2.5	2.0	2.4	2.9	2.4	2.3
4	.....	.....	.....	4.2	4.8	3.8	2.5	2.0	2.3	2.8	2.5	2.2
5	.....	.....	.....	4.2	4.9	3.7	2.6	2.1	2.2	2.9	2.5	2.2
6	.....	.....	.....	4.3	5.0	3.5	2.5	2.1	2.2	2.9	2.4	2.1
7	.....	.....	.....	4.2	5.1	3.4	2.4	2.2	2.3	3.0	2.3	2.2
8	.....	.....	.....	4.1	5.2	3.3	2.5	2.3	2.2	3.1	2.4	2.2
9	.....	.....	.....	4.0	5.3	3.2	2.5	2.3	2.2	3.0	2.5	2.3
10	.....	.....	.....	4.0	5.2	3.2	2.6	2.3	2.3	3.0	2.6	2.3
11	.....	.....	.....	3.7	5.0	3.1	2.6	2.2	2.3	2.9	2.6	2.3
12	.....	.....	.....	3.6	4.9	3.0	2.5	2.2	2.5	2.9	2.5	2.2
13	.....	.....	.....	3.6	4.8	2.9	2.5	2.3	2.5	2.9	2.4	2.2
14	.....	.....	.....	3.5	6.0	2.9	2.4	2.3	2.7	2.8	2.4	2.3
15	.....	.....	.....	3.5	6.6	2.9	2.3	2.2	2.7	2.8	2.3	2.3
16	.....	.....	.....	3.4	6.7	2.8	2.3	2.2	2.8	2.7	2.3	2.3
17	.....	.....	.....	3.5	6.6	2.8	2.4	2.1	2.8	2.8	2.3	2.4
18	.....	.....	.....	3.5	6.5	2.7	2.5	2.1	2.8	2.7	2.4	2.4
19	.....	.....	.....	3.4	4.9	2.8	2.4	2.0	2.9	2.7	2.5	.....
20	.....	.....	.....	3.5	5.0	2.8	2.4	2.2	2.9	2.6	2.4	2.7
21	.....	.....	.....	3.7	5.1	2.7	2.3	2.1	3.0	2.6	2.3	.....
22	.....	.....	.....	4.0	4.7	2.7	2.2	2.2	3.1	2.5	2.3	.....
23	.....	.....	.....	4.2	4.7	2.6	2.3	2.2	3.2	2.5	2.2	.....
24	.....	.....	.....	4.5	4.6	2.7	2.3	2.3	3.1	2.4	2.2	2.7
25	.....	.....	.....	4.6	4.6	2.7	2.2	2.2	3.0	2.5	2.3	.....
26	.....	.....	.....	4.7	4.5	2.6	2.2	2.3	3.0	2.6	2.4	.....
27	.....	.....	.....	4.5	4.5	2.6	2.1	2.2	2.9	2.6	2.4	2.6
28	.....	.....	.....	4.3	4.5	2.5	2.1	2.3	2.9	2.5	2.3	.....
29	.....	.....	.....	4.2	4.4	2.6	2.1	2.3	2.8	2.5	2.4	.....
30	.....	.....	.....	4.1	4.2	2.6	2.0	2.3	2.9	2.4	2.4	.....
31	.....	.....	.....	.....	4.1	.....	2.0	2.4	.....	2.3	.....	2.7

NOTE.—Ice conditions prevailed January 1 to about March 31 and about December 17 to 31, 1907. Discharge during May, 1907, probably affected by log jams.

Daily gage height, in feet, of Escanaba River near Escanaba, Mich., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	.....	.....	.....	.....	5.9	3.0	2.7	2.1	1.9	1.8	1.9	2.0
2	.....	.....	.....	.....	5.7	3.1	2.7	2.2	1.8	1.9	1.8	2.1
3	2.7	.....	3.0	.....	5.3	3.3	2.9	2.3	1.8	2.0	1.7	2.3
4	.....	3.0	.....	.....	5.0	3.2	2.8	2.3	1.9	2.0	1.8	2.4
5	.....	.....	.....	.....	4.9	3.2	2.9	2.2	1.9	2.1	1.8	2.5
6	.....	.....	2.6	.....	4.5	3.3	2.9	2.4	1.8	2.1	1.8	.....
7	2.8	3.1	.....	.....	4.3	3.4	3.0	2.2	1.8	2.1	1.7	.....
8	.....	.....	.....	.....	4.3	3.4	2.6	2.1	1.7	2.0	1.7	.....
9	.....	.....	.....	.....	4.2	3.5	2.7	2.0	1.7	2.0	1.7	.....
10	2.8	.....	2.6	.....	4.2	3.5	2.6	2.1	1.8	2.1	1.9	.....
11	.....	3.2	.....	.....	3.9	3.4	2.4	2.2	1.8	2.0	1.9	.....
12	.....	.....	.....	4.2	3.9	3.5	2.5	2.2	1.8	1.9	1.8	2.5
13	.....	.....	2.7	4.2	4.0	3.3	2.4	2.3	1.8	1.9	1.8	.....
14	2.9	3.2	.....	4.4	3.9	3.3	2.4	2.4	1.7	1.8	1.8	.....
15	.....	.....	.....	5.0	3.9	3.2	2.3	2.3	1.7	1.9	1.9	.....
16	.....	.....	.....	5.2	3.8	3.2	2.2	2.2	1.8	1.9	2.0	.....
17	3.0	.....	2.8	5.2	3.7	3.1	2.2	2.3	1.8	2.0	2.0	.....
18	.....	3.3	.....	5.3	3.5	3.0	2.3	2.4	1.9	2.1	2.0	.....
19	.....	.....	.....	5.4	3.5	2.9	2.4	2.4	1.8	2.0	2.0	2.4
20	.....	.....	2.8	5.5	3.5	2.7	2.5	2.3	1.7	1.9	1.9	.....
21	2.9	3.3	.....	5.5	3.4	2.6	2.4	2.3	1.8	2.0	1.9	.....
22	.....	.....	.....	5.6	3.4	2.6	2.4	2.2	1.7	1.9	1.8	.....
23	.....	.....	.....	5.8	3.5	2.5	2.3	2.3	1.8	1.9	1.9	.....
24	2.8	.....	3.6	5.8	3.4	2.5	2.3	2.2	1.8	2.0	2.0	.....
25	.....	3.3	.....	5.9	3.3	2.4	2.4	2.1	1.9	2.0	2.0	.....
26	.....	.....	.....	5.9	3.2	2.4	2.5	2.0	1.9	2.0	2.0	2.5
27	.....	.....	3.6	6.0	3.2	2.4	2.3	2.0	2.0	2.1	1.9	.....
28	2.9	3.3	.....	6.1	3.2	2.5	2.2	1.9	2.1	2.1	2.0	.....
29	.....	.....	.....	6.2	3.1	2.5	2.1	1.8	2.0	2.1	2.0	.....
30	.....	.....	.....	6.2	3.1	2.4	2.2	1.9	2.0	2.0	2.0	.....
31	2.9	.....	3.5	.....	3.0	.....	2.1	1.9	.....	2.0	.....	.....

NOTE.—Ice conditions prevailed from January 1 to about April 10 and from about December 5 to 31, 1908. Gage readings are to water surface in a hole in the ice during the frozen periods, 1907 and 1908.

Rating table for Escanaba River near Escanaba, Mich., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.70	165	2.80	880	3.90	2,230	5.00	4,210
1.80	205	2.90	970	4.00	2,380	5.20	4,650
1.90	250	3.00	1,070	4.10	2,530	5.40	5,120
2.00	300	3.10	1,180	4.20	2,690	5.60	5,610
2.10	350	3.20	1,300	4.30	2,860	5.80	6,120
2.20	410	3.30	1,420	4.40	3,030	6.00	6,640
2.30	480	3.40	1,550	4.50	3,210	6.20	7,180
2.40	550	3.50	1,680	4.60	3,400	6.40	7,730
2.50	630	3.60	1,810	4.70	3,590	6.60	8,290
2.60	710	3.70	1,950	4.80	3,790	6.80	8,870
2.70	790	3.80	2,090	4.90	4,000		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on discharge measurements made during 1903 to 1908, and is well defined above gage height 2.0 feet.

For illustration of this rating curve see figure 1, page 23.

Monthly discharge of Escanaba River near Escanaba, Mich., for 1907 and 1908.

[Drainage area, 800 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
April	3,590	1,550	2,420	3.02	3.37	A.
May	8,580	2,530	4,390	5.49	6.33	B.
June	2,380	630	1,160	1.45	1.62	A.
July	710	300	531	.664	.77	A.
August	550	300	413	.516	.59	A.
September	1,300	410	779	.974	1.09	A.
October	1,180	480	829	1.04	1.20	A.
November	710	410	544	.680	.76	A.
December 1-16	480	350	446	.558	.33	B.
1908.						
April 12-30	7,180	2,690	5,320	6.65	4.70	A.
May	6,380	1,070	2,420	3.02	3.48	A.
June	1,680	550	1,100	1.38	1.54	A.
July	1,070	350	617	.771	.89	A.
August	550	205	406	.508	.59	A.
September	350	165	220	.275	.31	C.
October	350	205	294	.368	.42	B.
November	300	165	243	.304	.34	B.

NOTE.—Discharge during the log-driving season is liable to be affected by back water from jams. See measurement made May 7, 1907.

MENOMINEE RIVER DRAINAGE BASIN.

DESCRIPTION.

Menominee River, throughout its length of about 104 miles, forms part of the boundary line between northern Michigan and Wisconsin, and its drainage basin therefore lies in both Wisconsin and Michigan. The river is formed by the junction of Michigamme and Brule rivers and flows southeastward, emptying into Green Bay, an arm of Lake Michigan, near Menominee, Mich. Its total drainage area is about 4,000 square miles.

Michigamme River might well be called the main stream, as it is the largest and longest of the three tributaries that make up the main river. Downstream from the Michigamme, on the right or west bank, the following important tributaries enter: Paint River, which is called a tributary of Brule River, although it is much the larger stream of the two; and Brule, Pine, and Pemebonwon rivers; on the left or east bank are Sturgeon and Little Cedar rivers.

Michigamme River is said to rise in Lake Michigamme, the largest lake in the Menominee drainage basin, but the lake has a feeder which may be considered the continuation of the river and which rises within 12 miles of Lake Superior. The length of the Michigamme to its extreme source is about 72 miles; to Lake Michigamme about 51 miles. It is noteworthy that four of the largest tributaries enter the main stream above Iron Mountain, Mich., about six-tenths of the

total drainage area being above this point. This characteristic increases the value of the stream for water-power development.

The drainage basin is fairly regular in outline, being narrow in its lower portion and widest at the sources of the tributaries which form the river. The surface is in general covered deeply by glacial drift, but the Menominee and all its tributaries flow over hard crystalline rocks as far south as the mouth of Pike River, or fully two-thirds its length. Below the mouth of the Pike the river flows over sandstones and limestones. Most of the rapids and falls occur in the area of crystalline rocks above the mouth of Pike River, although there are several rapids and falls below this point. The country through which the river flows is almost mountainous in character, many high ridges giving diversity to the surface.

The Wisconsin tributaries rise in a high, flat plateau, abounding in lakes and swamps, among which Flambeau and Wisconsin rivers also head. Some of these rivers head in lakes only a few rods apart, and even in the same swamps in which the tributaries of the Menominee head. These lakes and swamps have an elevation of nearly 1,600 feet above sea level, or about 1,000 feet above Lake Michigan. The Michigan branches flow from a similar region of equal or higher elevation. The numerous lakes and swamps make the flow of the river uniform and steady.

The elevation of the headwater streams is as stated, about 1,600 feet above sea level; at the junction of Brule and Michigamme rivers the elevation is about 1,300 feet; at the highway bridge near Iron Mountain, Mich., the elevation is about 1,050 feet; and at the mouth of the river it is 580 feet.

Forest conditions in this basin are similar to those in the other basins in Wisconsin and Michigan. Lumbering, while declining since 1892, is still active. Probably all the first-class timber has been cut, and that which is being cut at the present time is the smaller and less valuable timber that was left. The forest conditions, as far as their effect upon run-off conditions is concerned, are not greatly different from what they were originally, as the region is not thickly settled, and a second growth soon springs up after the lumbermen.

The mean annual rainfall is about 32 inches. The winters are severe, the snowfall being heavy and remaining on the ground for long periods, and the streams being ice-covered from three to four months.

Storage possibilities have not been fully investigated, but the large number of lakes and swamps must afford many excellent reservoir sites. At the present time lumbermen store water for running logs, and the enlargement of many of these dams would undoubtedly give good-sized reservoirs.

Some excellent water-power sites have been developed on the main stream and its tributaries, but many others, some of which have hardly been seen except by the lumbermen, are awaiting development. (See Pl. III.) With opportunities for storage with which to produce a uniform and increased low-water flow, and with the favorable arrangement of its drainage basin, this river will in time be one of the biggest power producers in this section.

This river is still used for running logs and the lumbermen's dams for holding water for flooding modify the normal flow of the stream considerably. Dams on the stream for power development should be so built as not to interfere with log running.

Iron is mined at many places in the upper two-thirds of the basin, and the section is fairly well covered with railroads.

The following gaging stations have been maintained in this drainage basin:

Menominee River near Iron Mountain, Mich., 1902 to 1908.
Menominee River at Lower Quinnesec Falls, Wis., 1898 to 1899.
Menominee River at Koss, Mich., 1907 to 1908.
Iron River at Riverton Mine, Mich., 1900 to 1905.

MENOMINEE RIVER NEAR IRON MOUNTAIN, MICH.

This station is located at the Homestead highway bridge across the Menominee River about 3½ miles south of Iron Mountain, Mich. It was established September 4, 1902, to obtain data for studying water power, water supply, and pollution problems, as well as general statistical and comparative data.

Pine River is tributary to the Menominee about 5 miles above the station. The gage was formerly located on the right abutment of the bridge, but on November 18, 1904, a chain gage was installed so as to obtain gage readings during the winter months, as ice formed at the gage on the abutment.

The winter conditions are severe in this locality, but as the current is swift the river is rarely entirely closed at this section. As is shown by the discharge measurements, however, there is backwater effect from ice below the station.

The stream is used extensively for logging and is subject to artificial control at times. Logs jams often occur below the station and produce backwater at the gage. Except as above stated the station is an excellent one.

The datum of the gage has remained unchanged. The observed records are accurate, but the discharge measurements and gage heights should be used with caution, so as to guard against possible backwater effects.

This station was last inspected July 15, 1908.

Discharge measurements of Menominee River near Iron Mountain, Mich., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 18	A. H. Horton	216	2,270	7.61	5,960
May 8	do	220	2,820	10.01	9,020
June 20[a]	G. A. Gray	205	1,210	2.98	1,940
August 22[a]	do	208	1,460	4.00	2,490
October 16	do	207	1,280	3.18	2,280
Do	do	207	1,280	3.18	2,280
December 17[b]	do	195	995	2.20	1,270
1908.					
July 15	G. A. Gray	203	1,000	2.00	1,520

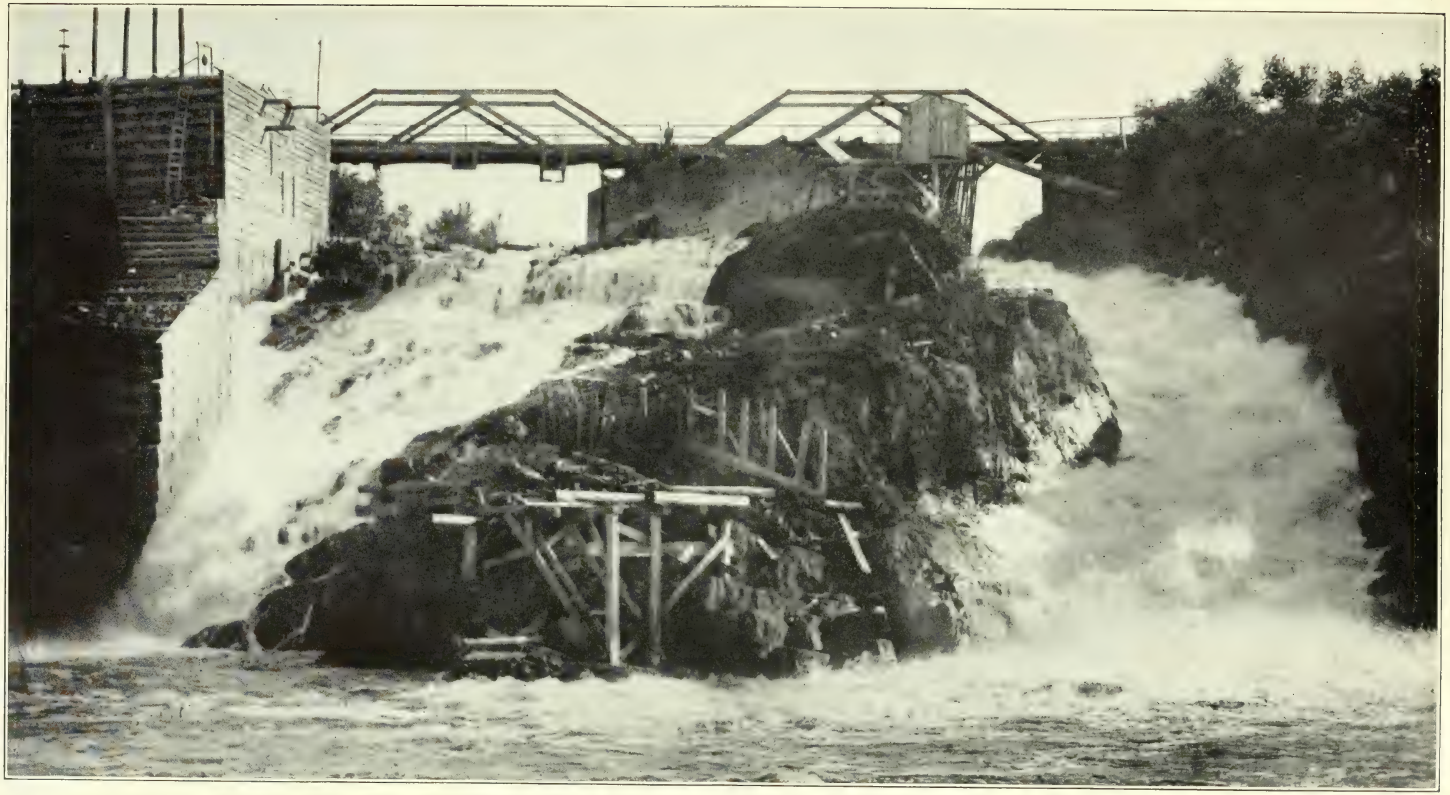
[a] Affected by log jams. [b] Affected by ice conditions.

Daily gage height, in feet, of Menominee River near Iron Mountain, Mich., for 1907 and 1908.

[Observer, Alfred J. St. Arnauld.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1				7.3	7.6	8.5	5.9	1.3	1.6	3.4	2.4	1.8
2				7.3	7.8	8.0	1.9	1.6	1.25	3.3	2.4	1.8
3				7.3	8.4	7.8	6.1	1.5	1.35	3.2	2.6	1.9
4				7.7	9.6	7.6	5.8	1.5	1.6	3.3	2.8	1.9
5				7.6	9.6	8.3	5.3	1.2	1.6	3.3	2.5	2.1
6				7.3	9.8	7.6	4.5	1.1	2.0	3.3	2.45	2.2
7				7.5	9.8	5.2	4.5	1.3	2.0	3.3	2.5	3.0
8				7.6	10.2	5.3	4.2	1.4	1.9	3.1	2.5	3.0
9				7.3	10.4	5.3	4.1	1.4	1.8	3.6	2.5	2.8
10				6.9	8.5	5.4	3.7	1.8	1.7	3.5		2.5
11				6.6	9.4	5.8	3.6	1.7	1.7	3.4		2.1
12				6.5	9.5	4.7	2.2	1.6	1.9	3.5	2.1	2.1
13				6.3	9.7	3.2	4.7	1.9	1.9	3.5	1.9	2.2
14				6.1	10.3	2.9	4.7	1.7	1.8	3.6	1.6	2.3
15				6.0	13.3	4.0	4.6	1.6	2.0	3.2	1.7	2.3
16				5.9	14.1	3.2	3.5	1.5	2.0	3.2	1.8	2.3
17				5.8	14.7	2.6	2.6	1.6	2.3	3.3	2.0	2.3
18				5.8	14.3	2.9	3.7	1.6	2.3	3.0	2.4	2.4
19				5.7	12.7	3.6	2.1	1.8	3.8	2.8	2.2	2.5
20				5.6	13.0	3.0	1.9	1.8	4.6	2.8	2.1	2.3
21				5.8	11.8	3.5	1.9	2.8	4.8	2.9	2.2	2.3
22				6.1	10.9	3.8	2.1	2.6	4.8	2.5	2.4	2.3
23				7.3	12.6	3.9	1.4	2.05	5.0	2.5	2.2	2.5
24			3.8	8.3	11.3	3.2	1.6	3.2	5.3	2.6	2.5	2.5
25			4.3	8.5	10.0	4.5	1.3	1.7	5.3	2.6	2.9	2.4
26			4.8	8.6	10.0	4.8	1.2	3.1	5.2	2.4	2.7	2.3
27			5.25	8.9	10.0	5.6	1.6	2.95	5.0	2.8	1.8	2.3
28			6.65	8.8	9.8	6.8	1.4	2.8	4.9	3.0	1.9	2.3
29			7.2	8.6	9.7	6.2	1.4	2.6	4.4	2.4	1.8	2.3
30			7.5	7.6	9.0	6.0	1.6	2.55	3.7	2.45	1.8	2.3
31			7.5		8.5		1.3	1.8		2.4		2.3
1908.[a]												
1		2.4	2.5	2.8	11.1	8.2	2.7	4.0	1.1	4.2	1.5	2.8
2		2.4	2.4	2.8	9.9	7.8	1.5	3.6	1.1	4.0	1.4	2.0
3		2.4	2.4	2.9	9.5	7.5	1.4	3.0	1.2	4.0	1.2	2.0
4		2.4	2.5	2.9	9.1	7.8	1.8	2.5	1.2	3.8	1.1	2.4
5	3.0	2.4	2.5	3.6	8.9	9.0	1.6	2.4	1.3	3.8	1.2	2.5
6	2.6	2.4	2.5	4.2	7.4	8.1	2.5	1.9	1.3	3.8	1.5	2.3
7	2.6	2.4	2.5	4.1	7.4	11.0	2.4	1.9	1.2	3.4	1.5	2.1
8	2.3	2.5	2.5	3.9	7.6	8.2	4.8	1.8	1.2	2.8	1.6	2.1
9	2.3	2.6	2.5	3.8	7.0	8.0	3.2	1.8	1.2	2.6	1.7	2.1
10	2.3	2.8	2.5	4.4	6.8	8.5	2.8	1.6	1.1	2.0	1.6	2.0

[a] See note at end of table, next page.



LOWER QUINNESEC FALLS, MENOMINEE RIVER, MICHIGAN.

Daily gage height, in feet, of Menominee River near Iron Mountain, Mich., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
11	2.3	2.9	2.5	6.4	6.1	8.7	2.6	1.4	1.1	2.0	1.2	2.0
12	2.3	2.9	2.6	6.2	5.3	8.4	2.3	1.4	1.1	1.8	1.0	2.0
13	2.3	2.7	2.7	6.0	4.4	8.6	2.1	1.3	1.1	1.6	1.4	2.0
14	2.3	2.7	3.0	6.8	3.3	4.1	1.6	1.4	.9	1.7	1.6	2.0
15	2.3	2.9	3.0	8.5	4.8	3.4	2.0	1.5	.9	1.8	1.6	2.0
16	2.4	2.9	3.0	9.9	4.9	3.9	2.0	1.5	.9	1.8	1.2	2.0
17	2.4	2.8	2.8	10.1	6.3	3.3	2.5	1.5	.9	1.7	1.2	1.9
18	2.4	2.8	2.8	9.4	4.6	2.8	3.7	1.5	1.4	1.7	1.3	1.9
19	2.5	2.5	2.7	9.1	5.2	1.9	3.0	1.5	1.0	1.6	1.8	1.9
20	2.5	2.5	2.8	8.9	6.5	1.9	3.3	1.4	1.0	1.4	1.6	1.9
21	2.4	2.5	2.8	9.2	6.2	1.8	3.0	1.2	.5	1.1	1.8	1.9
22	2.4	2.5	2.8	9.2	6.0	1.8	2.5	1.2	.6	1.5	1.8	1.9
23	2.4	2.5	2.8	9.4	5.6	1.4	2.4	1.3	.6	1.5	1.8	1.9
24	2.4	2.5	2.8	9.4	7.1	1.9	2.5	1.2	.6	1.7	1.8	1.9
25	2.4	2.5	2.8	8.9	5.4	1.4	2.7	1.3	.9	1.7	1.8	1.9
26	2.4	2.6	2.8	9.6	5.4	1.5	2.7	1.3	.9	1.7	2.4	1.9
27	2.4	2.5	2.7	11.1	5.6	1.4	2.4	1.4	1.5	1.7	2.8	1.9
28	2.3	2.5	2.6	12.8	5.6	1.2	2.4	1.5	2.0	1.6	2.8	1.9
29	2.3	2.5	2.6	12.8	5.4	1.1	1.9	1.3	3.3	1.7	2.8	1.9
30	2.4	.....	2.6	12.6	6.4	.9	2.9	1.3	4.2	1.6	2.8	1.8
31	2.4	.....	2.7	.....	6.2	.....	4.0	1.3	.....	1.5	.....	1.8

NOTE.—The discharge was affected by ice conditions from about January 1 to March 23 and December 7 to 31, 1907, and by log jams from about June to August, 1907.

Discharge affected by ice conditions from about January 1 to April 13, 1908. Discharge probably not materially affected by ice conditions during December, 1908. Discharge affected by log jams June 1 to 13, and probably also for short intervals at other times during 1908.

Rating table for Menominee River near Iron Mountain, Mich., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.50	700	2.00	1,515	3.50	2,540	6.00	4,680
0.60	745	2.10	1,575	3.60	2,615	6.20	4,870
0.70	795	2.20	1,640	3.70	2,690	6.40	5,060
0.80	845	2.30	1,705	3.80	2,765	6.60	5,260
0.90	895	2.40	1,770	3.90	2,840	6.80	5,460
1.00	950	2.50	1,835	4.00	2,920	7.00	5,660
1.10	1,005	2.60	1,900	4.20	3,080	8.00	6,740
1.20	1,060	2.70	1,970	4.40	3,240	9.00	7,890
1.30	1,115	2.80	2,040	4.60	3,405	10.00	9,070
1.40	1,170	2.90	2,110	4.80	3,575	11.00	10,300
1.50	1,225	3.00	2,180	5.00	3,750	12.00	11,540
1.60	1,280	3.10	2,250	5.20	3,930	13.00	12,800
1.70	1,335	3.20	2,320	5.40	4,110	14.00	14,080
1.80	1,395	3.30	2,390	4.60	4,300	15.00	15,380
1.90	1,455	3.40	2,465	5.80	4,490		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made during 1903 to 1908 and is well defined above gage height 2.0 feet.

Monthly discharge of Menominee River near Iron Mountain, Mich., for 1907 and 1908.

[Drainage area, 2,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
March 24-31	6,180	2,760	4,630	1.91	0.57	B.
April	7,680	4,300	5,780	2.39	2.67	B.
May	15,000	6,300	9,750	4.03	4.65	B.
June	7,220	1,900	3,980	1.64	1.83	B.
July	4,780	1,060	2,360	.975	1.12	C.
August	2,320	1,000	1,480	.612	.71	C.
September	4,680	1,090	2,290	.946	1,06	B.
October	2,620	1,770	2,210	.913	1.05	B.
November	2,110	1,280	1,680	.694	.77	B.
December	1,640	.....	1,320	.545	.63	D.
1908.						
January	.....	.....	1,100	.455	.52	D.
February	.....	.....	1,000	.413	.45	D.
March	.....	.....	1,000	.413	.48	D.
April	12,500	.....	5,710	2.36	2.63	C.
May	10,400	2,390	5,250	2.17	2.50	B.
June	.....	895	2,870	1.19	1.33	C.
July	3,580	1,170	1,900	.785	.90	B.
August	2,920	1,060	1,370	.566	.65	B.
September	3,080	700	1,100	.455	.51	B.
October	3,080	1,000	1,690	.698	.80	B.
November	2,040	950	1,350	.558	.62	B.
December	2,040	1,400	1,530	.632	.73	B.
The year	12,500	.....	2,160	.891	12.12	

NOTE.—Discharge during the frozen periods and during the period of log jam, June 1 to 13, 1908, estimated on the basis of the discharge at Koss and one measurement made under ice conditions, December 17, 1907. Discharge December 7 to 31, 1907, 1,280 second-feet; April 1 to 13, 1908, 1,500 second-feet; June 1 to 13, 1908, 4,500 second-feet.

MENOMINEE RIVER AT KOSS, MICH.

This station, which is located at the Wisconsin and Michigan Railroad bridge at Koss, Mich., was established July 21, 1907, to obtain data for studying water power, water supply, and pollution problems, and for general statistical and comparative uses.

This stream is used for logging and log jams occur frequently at the station and immediately below. The winter conditions are severe, ice forming about 2 feet thick at times. The records are reliable and accurate except as affected by the above conditions.

The datum of the gage has remained unchanged.

Discharge measurements of Menominee River at Koss, Mich., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.	Thickness of ice.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*	*Feet.*
June 21	G. A. Gray	246	1,590	8.04	3,870	.....
July 19	do	242	1,380	7.27	2,650	.....
August 23	do	235	1,150	6.15	1,080	.....
October 15	do	280	1,540	7.35	2,950	.....
November 12	do	278	1,460	7.10	2,640	.....
1908.						
January 21[a]	G. A. Gray	258	1,360	7.15	1,900	1.1
February 11[a]	do	274	1,490	7.70	1,830	1.2
March 10[a]	do	283	1,380	7.85	1,800	1.8
Do[a]	do	283	1,380	7.85	1,790	1.8
April 15	do	298	2,480	10.40	8,430	.....
April 16	do	299	2,630	10.90	9,130	.....
Do[b]	do	299	2,650	11.00	8,800	.....
July 14	do	261	1,560	7.95	3,160	.....
September 19	do	269	1,180	6.30	1,460	.....

[a] Discharge made under ice conditions.
[b] Measurement approximate; velocity determined by means of floats.

Daily gage height, in feet, of Menominee River at Koss, Mich., for 1907 and 1908.

[Observers, W. D. Flynn and G. H. Bronoel.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	.....	.....	.....	8.0	7.3	7.35	8.1	6.9	6.95
2	.....	.....	.....	.....	.....	.....	8.4	6.6	6.1	7.9	6.9	6.8
3	.....	.....	.....	.....	.....	.....	8.0	6.9	7.2	7.6	6.9	6.8
4	.....	.....	.....	.....	.....	.....	7.9	6.85	6.6	7.55	7.0	7.1
5	.....	.....	.....	.....	.....	.....	8.2	6.95	7.5	7.4	7.1	7.0
6	.....	.....	.....	.....	.....	.....	8.15	7.75	6.5	7.2	7.15	7.0
7	.....	.....	.....	.....	.....	.....	8.35	7.0	7.9	6.85	7.05	7.0
8	.....	.....	.....	.....	.....	.....	7.7	6.75	6.7	6.95	7.0	7.0
9	.....	.....	.....	.....	.....	.....	7.9	7.1	7.95	7.05	7.0	7.0
10	.....	.....	.....	.....	.....	.....	8.15	6.75	6.6	7.0	7.0	7.1
11	.....	.....	.....	.....	.....	.....	7.75	7.0	8.25	7.05	7.0	7.1
12	.....	.....	.....	.....	.....	.....	7.4	6.75	8.35	7.1	7.1	7.1
13	.....	.....	.....	.....	.....	.....	6.95	7.0	8.6	7.05	6.95	7.0
14	.....	.....	.....	.....	.....	.....	7.55	7.75	8.25	7.05	6.7	6.9
15	.....	.....	.....	.....	.....	.....	8.0	6.55	7.7	7.4	6.7	6.9
16	.....	.....	.....	.....	.....	.....	7.85	6.75	7.55	8.0	6.95	6.9
17	.....	.....	.....	.....	.....	.....	7.7	6.7	7.85	7.45	6.9	7.15
18	.....	.....	.....	.....	.....	.....	7.6	6.7	8.2	7.4	6.9	7.0
19	.....	.....	.....	.....	.....	.....	7.3	6.75	8.8	7.4	7.1	6.9
20	.....	.....	.....	.....	.....	.....	7.6	6.5	9.6	7.3	7.1	6.9
21	.....	.....	.....	.....	.....	8.25	7.65	6.7	9.6	7.3	7.1	6.9
22	.....	.....	.....	.....	.....	8.35	7.0	7.1	9.75	7.3	7.1	6.9
23	.....	.....	.....	.....	.....	8.45	7.8	7.55	9.65	7.3	7.2	6.9
24	.....	.....	.....	.....	.....	9.1	7.65	6.8	9.6	7.25	7.2	6.9
25	.....	.....	.....	.....	.....	8.25	6.75	7.15	9.45	7.15	7.1	6.9
26	.....	.....	.....	.....	.....	8.6	7.35	7.5	8.95	7.0	7.0	6.9
27	.....	.....	.....	.....	.....	8.6	7.45	6.4	9.0	6.95	7.0	6.9
28	.....	.....	.....	.....	.....	8.5	7.6	7.35	8.55	6.9	6.9	7.0
29	.....	.....	.....	.....	.....	8.3	6.7	6.55	8.55	7.15	6.8	7.0
30	.....	.....	.....	.....	.....	8.25	7.25	7.45	8.2	7.10	6.8	7.0
31	.....	.....	.....	.....	.....	.....	6.95	6.45	.....	7.05	.....	7.0
1908.												
1	7.2	.....	.....	7.9	13.4	9.05	7.15	6.1	5.6	7.45	6.5	7.2
2	.....	.....	7.5	7.9	13.25	9.65	7.45	8.7	5.65	7.6	6.5	7.05
3	6.9	7.4	.....	8.05	12.8	10.05	8.1	8.25	6.55	7.6	6.5	6.9
4	.....	.....	.....	8.0	12.2	10.2	7.95	7.6	6.95	7.6	6.5	6.8
5	.....	.....	.....	8.05	11.9	9.4	6.85	6.1	6.45	7.5	6.55	6.7
6	6.4	.....	7.5	8.1	11.5	8.7	7.05	8.05	6.35	7.25	6.4	6.7
7	.....	7.5	.....	8.55	10.8	8.75	8.2	5.9	6.3	7.1	6.5	6.75
8	.....	.....	.....	9.2	10.55	9.0	8.7	7.85	6.2	7.0	6.5	6.7
9	.....	.....	.....	9.35	10.2	9.25	9.1	5.85	6.35	6.9	6.5	6.7
10	6.9	7.5	7.85	9.4	9.7	9.7	9.05	7.7	6.4	6.9	6.55	6.9
11	.....	7.7	.....	9.5	9.6	9.85	8.55	5.85	6.35	6.8	6.7	6.7
12	.....	.....	.....	9.5	9.6	9.75	8.0	7.75	6.2	6.7	6.5	7.05
13	6.9	.....	8.0	10.2	9.6	9.55	7.9	5.9	6.15	6.7	6.5	6.85
14	.....	7.6	.....	10.35	9.55	9.2	7.9	7.5	6.1	6.6	6.5	6.8
15	.....	.....	.....	10.5	9.45	8.9	6.4	5.8	6.25	6.75	6.5	6.8
16	.....	.....	8.0	11.0	9.5	8.7	8.45	5.6	6.4	6.7	6.4	6.8
17	.....	7.8	.....	11.35	9.7	8.25	6.35	7.5	6.35	6.6	6.1	6.85
18	6.9	.....	.....	11.75	9.45	7.8	8.3	5.75	6.3	6.6	6.4	6.8
19	.....	.....	.....	11.75	9.55	7.75	8.25	7.45	6.2	6.6	6.6	7.0
20	6.9	.....	7.9	11.25	9.5	7.3	8.7	5.75	6.25	6.6	6.6	7.25
21	7.15	7.5	.....	10.95	9.9	8.2	8.35	7.3	6.15	6.5	6.6	6.8
22	.....	.....	.....	11.1	9.85	7.85	8.15	5.7	6.2	6.4	6.4	6.8
23	.....	.....	7.9	11.0	9.85	7.45	7.95	5.75	6.2	6.4	6.35	7.0
24	6.9	7.5	.....	11.0	9.45	7.3	7.8	7.65	6.2	6.4	6.55	7.0
25	.....	.....	.....	11.0	9.4	7.6	7.95	5.65	6.2	6.4	6.8	6.9
26	.....	.....	.....	11.0	9.55	7.9	6.0	6.75	6.2	6.5	6.9	6.9
29	6.9	.....	7.9	12.35	9.25	7.8	8.2	5.7	6.2	6.7	6.85	7.0
28	.....	7.5	.....	12.9	9.1	8.0	6.35	6.0	6.2	6.7	7.1	6.9
29	.....	.....	.....	13.15	8.55	6.65	8.2	7.05	6.3	6.6	7.2	6.9
30	.....	.....	7.8	13.25	8.75	7.4	6.0	5.65	6.55	6.5	7.3	7.0
31	6.9	.....	.....	.....	8.8	.....	7.95	6.5	.....	6.6	.....	7.0

NOTE.—Ice conditions prevailed from December 22 to 31, 1907. Gage readings during this period were to the top of the ice. Discharge affected by log jams at times during 1907.

Ice conditions prevailed January 1 to about April 13, 1908. Gage readings during this period are to water surface, except April 1 to 4. Ice conditions prevailed November 17 and December 30 to 31, 1908. Gage readings on these days were to the top of the ice. Discharge affected by log jams during July and the first part of August, 1908.

Rating tables for Menominee River at Koss, Mich.

JUNE 21 TO SEPTEMBER 18, 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
6.10	1,045	6.90	2,085	7.70	3,295	8.50	4,650
6.20	1,165	7.00	2,230	7.80	3,460	8.60	4,825
6.30	1,285	7.10	2,375	7.90	3,630	8.70	5,000
6.40	1,405	7.20	2,525	8.00	3,800	8.80	5,175
6.50	1,530	7.30	2,675	8.10	3,970	8.90	5,350
6.60	1,665	7.40	2,825	8.20	4,140	9.00	5,525
6.70	1,800	7.50	2,980	8.30	4,310	9.10	5,705
6.80	1,940	7.60	3,135	8.40	4,480		

NOTE.—The above table is not applicable for obstructed-channel conditions. It is based on three discharge measurements made during 1907 and the form of the 1908 curve. It is fairly well defined.

SEPTEMBER 19, 1907, TO DECEMBER 31, 1908.

5.60	688	6.90	2,305	8.20	4,360	10.00	7,580
5.70	790	7.00	2,450	8.30	4,530	10.20	7,950
5.80	895	7.10	2,600	8.40	4,700	10.40	8,330
5.90	1,005	7.20	2,750	8.50	4,875	10.60	8,715
6.00	1,120	7.30	2,900	8.60	5,050	10.80	9,105
6.10	1,240	7.40	3,055	8.70	5,225	11.00	9,495
6.20	1,360	7.50	3,210	8.80	5,400	11.20	9,890
6.30	1,485	7.60	3,370	8.90	5,580	11.40	10,290
6.40	1,610	7.70	3,530	9.00	5,760	11.60	10,690
6.50	1,740	7.80	3,695	9.20	6,120	11.80	11,100
6.60	1,875	7.90	3,860	9.40	6,480	12.00	11,510
6.70	2,015	8.00	4,025	9.60	6,840	13.00	13,670
6.80	2,160	8.10	4,190	9.80	7,210	13.50	14,800

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on five discharge measurements made during 1907 and 1908 and is fairly well defined between gage heights 6 feet and 11 feet.

Monthly discharge of Menominee River at Koss, Mich., for 1907 and 1908.

[Drainage area, 3,780 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
June 21–30	5,700	4,220	4,590	1.21	0.45	B.
July	4,480	1,800	3,220	.852	.98	B.
August	3,380	1,400	2,170	.574	.66	B.
September	7,120	1,040	4,240	1.12	1.25	B.
October	4,190	2,230	2,860	.757	.87	B.
November	2,750	2,020	2,430	.643	.72	B.
December	2,680	2,160	2,350	.622	.72	B.
1908.						
January	.....	.....	1,980	.524	.60	C.
February	.....	.....	1,800	.476	.51	C.
March	.....	.....	1,800	.476	.55	C.
April	14,200	.....	7,050	1.87	2.09	B.
May	14,600	4,960	7,920	2.10	2.42	B.
June	7,950	1,940	5,040	1.33	1.48	B.
July [a]	5,940	1,120	3,740	.989	1.14	B.
August [a]	5,220	688	2,100	.556	.64	B.
September	2,380	688	1,440	.381	.43	B.
October	3,370	1,610	2,200	.582	.67	B.
November	2,900	1,240	1,880	.497	.55	B.
December	2,820	2,020	2,270	.601	.69	B.
The year	14,600	688	3,270	.865	11.77	

[a] Results slightly too high on account of log jams.

NOTE.—Discharge during the frozen periods 1907 and 1908 based on four measurements made under ice conditions which showed a fairly uniform rate of flow.

Discharge December 22 to 31, 1907, 2,200 second-feet; April 1 to 13, 1908, 2,470 second-feet; November 17, 1908, open-channel rating used; December 30 to 31, 1908, 2,150 second-feet.

PESHTIGO RIVER DRAINAGE BASIN.

DESCRIPTION.

Peshtigo River rises in the western part of Forest County, northeastern Wisconsin, flows southeastward across the southwestern part of Marinette County, and empties into Green Bay, an arm of Lake Michigan, at the extreme southeast corner of Marinette County, about 7 miles south of Marinette. The drainage area measured above the mouth comprises about 1,123 square miles.

The drainage basin is narrow and fairly regular in outline, being about 80 miles long and 14 miles in average width. The river itself is about 150 miles long. Its tributaries are small. Among the larger ones are Rat, Thunder, and Little rivers, entering on the west or right bank, and Eagle Nest and Noque Bay rivers, entering on the east or left bank. In the upper two-thirds of its course the river flows through an area of ancient crystalline rocks; in the lower third it crosses successively beds of sandstone and limestone. The most important falls and rapids are in the crystalline area.

The river rises in the highest land in northern Wisconsin. At North Grandon railroad crossing, near its sources, the elevation of the river is 1,620 feet above sea level, at the mouth the elevation is 580 feet, making a total fall of 1,040 feet in about 140 miles, or an average fall of about 7 feet to the mile. This high average gradient gives rise to more and larger rapids than in any other river in Wisconsin, and, together with the high and rocky banks, insures numerous water powers.

As in other parts of Wisconsin, practically all the original growth of timber has been cut off and has been replaced by second growth and brush. A considerable area is being brought under cultivation. It is not thought that these changes in forestry conditions have appreciably altered the flow of the streams, but a marked effect upon the run-off may be expected to follow the draining of the numerous swamps and lakes at the sources of the river.

The mean annual rainfall is about 32 inches. Winter conditions are severe, the river being icebound for about three months of each year.

The opportunities for storage have not been investigated, but excellent sites for reservoirs must be afforded by the numerous lakes and swamps in the basin.

The stream presents numerous opportunities for water-power users. It has been estimated that about 32,000 horsepower await development on this river at various points.

The stream is still used to some extent for logging, but the run of logs is small. A good share of the timber is being used for pulp.

The following gaging stations have been maintained in this drainage basin:

Peshtigo River near Crivitz, Wis., 1906 to 1908.
Peshtigo River at Crivitz, Wis., 1906.

PESHTIGO RIVER SURVEY.

In order to point out the power possibilities along Peshtigo River, a survey was made during 1906 from the mouth to Rat River. From the data collected on this survey sheets have been prepared showing a profile of the water surface, a plan of the river, contour along the bank, and prominent natural or artificial features.

The results of this survey have been published on separate sheets and may be had upon application to the Director of the Geological Survey.

PESHTIGO RIVER NEAR CRIVITZ, WIS.

This station is located at Herman's farm, in the SE. ¼ NW. ¼ sec. 26, T. 32 N., R. 19 E., about 4½ miles west of Crivitz, Wis. It was established September 7, 1906, to obtain data for studying water-power problems.

No important tributaries enter near the station. The drainage area above the section is about 670 square miles.

Winter conditions are severe, ice forming to a thickness of 1 to 2 feet and lasting about three months. The gage heights may also be affected to a slight extent by logging operations.

The datum of the gage has remained unchanged and the records are reliable and accurate.

The gage heights at this station were furnished by D. W. Mead.

Information in regard to this station prior to 1908 is contained in Bulletin No. 20 of the Wisconsin Geological and Natural History Survey, entitled "The water powers of Wisconsin," by Leonard S. Smith.

Daily gage height, in feet, of Peshtigo River near Crivitz, Wis., for 1907 and 1908.

[Observer, Rose Herman.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3.2	3.3	2.9	4.6	4.7	3.8	3.85	2.7	2.5	2.95	2.6	2.55
2	3.1	3.15	2.9	4.65	4.6	3.7	3.95	2.65	2.5	2.95	2.6	2.55
3	3.1	3.2	2.95	4.5	4.6	3.8	3.7	2.6	2.4	2.9	2.6	2.5
4	3.1	3.3	3.0	4.55	4.8	3.7	3.0	2.6	2.5	2.9	2.6	2.5
5	3.2	3.3	2.95	4.5	4.8	2.7	3.25	2.65	2.5	2.9	2.6	2.5
6	3.1	3.45	3.0	4.35	4.9	3.0	3.75	2.65	2.55	2.8	2.6	2.5
7	3.1	3.45	3.0	4.35	5.0	3.2	3.0	2.65	2.6	2.8	2.55	2.6
8	3.05	3.25	2.9	4.2	5.1	3.5	3.65	2.65	2.7	2.75	2.55	2.5
9	2.75	3.2	2.95	4.2	5.15	3.35	2.8	2.6	2.8	2.7	2.55	2.6
10	3.2	3.05	3.0	4.0	4.1	4.25	3.15	2.6	2.8	2.7	2.5	2.6
11	3.2	3.1	3.0	4.0	5.2	3.9	2.5	2.6	2.9	2.7	2.5	2.55
12	3.25	3.05	2.9	4.0	4.4	3.75	2.45	2.7	3.0	2.7	2.45	2.5
13	3.3	3.05	2.8	3.95	4.3	4.45	2.3	2.65	3.1	2.7	2.6	2.45
14	3.2	3.1	2.8	2.7	4.0	4.0	2.3	2.6	3.05	2.7	2.25	2.4
15	3.25	3.1	2.75	3.8	5.55	4.0	2.2	2.55	3.0	2.75	2.25	2.5
16	3.3	3.15	2.85	3.5	5.7	2.9	2.3	2.55	2.95	2.8	2.25	2.5
17	3.3	3.1	2.8	2.7	5.8	3.25	2.9	2.5	2.95	2.75	2.6	2.5
18	3.0	3.05	2.75	2.8	5.75	2.5	2.85	2.5	2.95	2.75	2.55	2.5
19	3.0	3.05	3.0	2.8	5.6	2.9	2.85	2.55	3.65	2.7	2.55	2.5
20	2.95	3.1	2.85	2.8	5.3	3.95	2.8	2.6	3.85	2.7	2.5	2.55
21	3.1	3.0	3.0	2.8	4.9	4.0	2.75	2.65	4.0	2.65	2.6	2.45
22	3.0	3.0	3.05	2.85	5.1	3.5	2.7	2.7	3.95	2.6	2.65	2.55
23	3.0	2.9	3.3	2.9	5.0	3.05	2.7	2.7	3.8	2.6	2.65	2.5
24	3.1	2.9	3.5	3.0	4.65	3.0	2.7	2.7	3.65	2.6	2.6	2.45
25	3.15	2.9	3.7	3.0	4.85	2.75	2.7	2.7	3.55	2.85	2.6	2.45
26	3.15	2.9	3.95	3.0	4.55	2.75	2.8	2.65	3.35	2.75	2.6	2.45
27	3.2	3.0	3.9	3.0	4.3	2.7	2.7	2.6	3.2	2.65	2.6	2.45
28	3.25	2.9	4.4	3.2	4.25	3.0	2.7	2.6	3.05	2.6	2.6	2.5
29	3.3	.....	4.65	4.4	4.2	2.6	2.7	2.6	3.0	2.6	2.55	.....
30	3.3	.....	4.8	4.7	4.05	2.6	2.6	2.55	2.95	2.6	2.55	.....
31	3.25	.....	4.65	.....	4.0	.....	2.6	2.55	.....	2.6	.....	.....
1908.												
1	2.5	2.7	3.05	2.6	5.7	3.4	2.8	2.4	2.25	2.7	2.3	2.35
2	2.5	2.9	3.1	2.6	5.6	2.4	2.7	2.4	2.2	2.7	2.3	2.6
3	2.5	2.9	3.1	2.55	5.4	3.3	3.0	2.4	2.2	2.65	2.3	2.6
4	2.45	2.85	3.1	2.6	4.6	3.25	3.15	2.35	2.2	2.55	2.3	2.4
5	2.45	2.9	3.1	2.8	4.25	3.2	2.45	2.35	2.2	2.5	2.3	2.4
6	2.4	2.9	3.3	2.9	3.8	2.6	3.0	2.35	2.2	2.0	2.3	2.6
7	2.4	2.9	3.3	3.05	3.65	3.25	3.95	2.3	2.2	2.0	2.3	2.5
8	2.4	2.95	3.2	3.1	3.2	2.7	3.8	2.3	2.15	2.0	2.3	2.5
9	2.4	2.95	3.2	3.05	3.0	3.7	3.75	2.3	2.15	2.0	2.3	2.6
10	2.6	2.9	3.25	3.3	3.2	3.65	3.85	2.3	1.85	3.0	2.3	2.5
11	2.5	2.9	3.3	3.55	3.8	3.65	3.2	2.25	1.9	2.4	2.15	2.5
12	2.5	3.0	3.25	3.7	3.2	2.7	2.7	2.25	2.0	2.35	2.25	2.5
13	2.55	3.05	3.0	3.9	4.0	2.7	3.0	2.3	2.0	2.2	2.2	2.5
14	2.5	3.05	2.75	3.5	3.3	3.25	2.45	2.3	2.0	2.2	2.2	2.5
15	2.5	3.05	2.6	4.4	3.8	3.2	2.6	2.25	2.8	2.2	2.2	2.5
16	2.5	3.0	2.6	4.35	3.9	3.4	2.4	2.3	2.3	3.0	2.2	2.5
17	2.6	2.95	2.5	4.35	3.8	3.25	3.3	2.3	2.25	2.5	2.0	2.5
18	2.6	2.95	2.45	4.3	4.0	3.0	2.7	2.3	2.15	2.1	2.4	2.5
19	2.5	2.95	2.4	4.2	4.0	2.9	2.7	2.3	2.15	2.1	2.35	2.6
20	2.5	2.95	2.4	3.2	4.0	2.8	3.3	2.3	2.15	2.1	2.2	2.6
21	2.5	3.05	2.45	3.0	4.75	2.3	2.8	2.5	2.15	2.1	2.2	2.6
22	2.5	3.05	2.45	2.8	5.0	2.4	3.75	2.3	2.15	3.3	2.3	2.6
23	2.45	3.05	2.6	2.9	4.65	3.2	2.4	2.3	2.2	2.6	2.3	2.6
24	2.65	3.05	2.5	3.0	4.7	3.3	3.5	2.25	2.2	2.55	2.4	2.6
25	2.6	3.0	2.5	3.6	4.1	2.9	2.95	2.25	2.2	2.4	2.85	2.6
26	2.5	3.0	2.5	4.65	3.85	3.2	2.8	2.25	2.2	2.4	2.85	2.6
27	2.5	3.05	2.5	4.8	3.75	2.3	2.75	2.25	2.2	2.4	2.95	2.6
28	2.5	3.05	2.5	5.3	3.7	2.4	2.7	2.25	2.4	2.4	2.9	2.6
29	2.6	3.05	2.5	5.8	3.55	3.8	2.65	2.3	2.35	2.4	2.75	2.55
30	2.6	.....	2.5	5.8	3.5	2.5	2.5	2.3	2.6	2.4	2.7	2.6
31	2.7	.....	2.75	.....	3.4	.....	2.5	2.25	.....	2.3	.....	2.5

NOTE.—Ice conditions prevailed from about January 1 until the latter part of March and during the greater portion of December, 1907, and from about January 1 to the first part of April and during December, 1908.

OCONTO RIVER DRAINAGE BASIN.

DESCRIPTION.

Oconto River rises in the plateau region of northeastern Wisconsin in a number of small lakes and swamps in the southern part of Forest County, flows in a slight southeasterly direction across Oconto County until it passes the southern boundary of that county, then turns abruptly to the east and flows into Green Bay at Oconto, Wis. Its mouth is about 10 miles southwest of the mouth of Peshtigo River.

Its drainage basin which is somewhat irregular in outline is about 70 miles long, following the general course of the river, and has an average width of about 15 miles. The total drainage area is about 950 square miles. The total length of the river is about 90 miles. The important tributaries are as follows: South Branch of the Oconto, and Peshtigo Brook and Little River on the left or east bank. The elevation of the headwaters is about 1,530 feet above sea level; at the mouth the elevation is 580 feet; the total fall therefore is 950 feet, or an average fall of over 10 feet to the mile. In the upper 35 miles of its course the river flows over crystalline rocks, and in this stretch is found about two-thirds of the total fall. On leaving the crystalline rocks the river flows nearly due south for 20 miles over sandstones and in its eastward stretch it crosses limestones. As in other parts of Wisconsin, the original forest growth has almost been all lumbered and a second growth is taking its place on those areas that are not being brought under cultivation. It is doubtful if the change in the forestry conditions has had any harmful effect on the run-off at the present time.

The mean annual rainfall is about 32 inches. The winter conditions are severe. The snowfall is comparatively heavy and remains on the ground for long periods. Ice forms from a foot to 2 feet in thickness and lasts for about three months.

Storage possibilities have not yet been investigated, but as lakes and swamps are numerous, excellent sites for reservoirs must exist.

The stream affords many valuable water-power sites whose development is only awaiting a demand for power.

The river is used to some extent for running logs, but the runs are small, and the timber is not large; a great deal of it is used for manufacturing pulp.

The following gaging stations have been maintained in this drainage basin:

Oconto River near Gillett, Wis., 1906–1908.
Oconto River at Stiles, Wis., 1906.

OCONTO RIVER NEAR GILLETT, WIS.

This station, which is located at a highway bridge about 2½ miles south of Gillett, Wis., was established June 27, 1906, to obtain data for studying water power, water supply, and pollution problems, and for general statistical data and comparative purposes.

No tributaries of any importance enter near the gaging station.

The winter conditions are severe, ice forming to a thickness of about 2 feet and lasting for about three months. The gage heights may also be affected for short periods by logging operations.

The datum of the gage has remained unchanged; the records, except as noted above, are reliable and accurate.

Information in regard to this station prior to 1908, is contained in Bulletin No. 20 of the Wisconsin Geological and Natural History Survey, entitled "The water powers of Wisconsin," by Leonard S. Smith.

Discharge measurements of Oconto River near Gillett, Wis., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.	Thickness of ice.
1907.		*Feet.*	*Sq.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*
April 10	A. H. Horton	72	354	6.10	940	.....
May 11	do	87	407	[a] 6.75	1,530	.....
June 24	G. A. Gray	76	327	5.67	685	.....
July 22	do	76	283	5.20	421	.....
August 26	do	55	246	5.00	329	.....
Do	do	55	246	4.90	326	.....
October 11	do	55	254	5.00	341	.....
Do	do	55	255	5.00	354	.....
November 8	do	56	262	5.15	405	.....
December 13 [b]	do	58	311	6.10	334	.....
1908.						
January 17 [c]	G. T. Gray	58	231	6.30	303	1.3
February 10 [c]	do	70	243	6.50	327	1.6
Do. [c]	do	70	243	6.50	324	1.6
March 9 [c]	do	70	240	6.75	390	1.9
Do. [c]	do	70	240	6.75	388	1.9
April 17	do	92	379	6.70	1,210	.....
Do	do	92	379	6.70	1,210	.....
April 20	do	90	364	6.50	1,130	.....
Do	do	90	364	6.50	1,120	.....
July 10	do	95	429	7.10	1,530	.....
September 18	do	56	251	5.05	322	.....

[a] Gage height doubtful; rise in stage of more than 1 foot during the measurement.
[b] Discharge under half frozen and half open conditions.
[c] Discharge made under ice conditions.

Daily gage height, in feet, of Oconto River near Gillett, Wis., for 1907 and 1908.

[Observer, Hattie Gilbertsen.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	7.1	6.3	7.3	6.65	5.05	4.9	5.8	6.0	5.0
2	.....	.....	.....	7.2	7.1	4.45	5.5	5.1	4.9	5.85	5.2	5.4
3	.....	.....	.....	6.1	6.5	4.1	5.6	5.25	4.8	5.8	5.0	5.1
4	.....	.....	.....	6.5	6.7	5.05	5.7	5.0	4.7	5.7	5.2	5.2
5	.....	.....	.....	6.75	6.5	5.0	5.2	4.9	4.5	5.7	5.2	6.1
6	.....	.....	.....	6.7	5.9	4.1	5.1	5.6	4.9	5.4	5.2	6.5
7	.....	.....	.....	6.55	6.35	4.8	5.1	5.5	4.8	5.65	5.2	5.8
8	.....	.....	.....	6.9	6.2	5.1	4.9	5.0	4.8	4.8	5.15	5.3
9	.....	.....	.....	6.8	7.3	4.5	5.3	4.5	5.0	5.3	5.2	5.2
10	.....	.....	.....	6.1	5.8	7.1	4.8	4.5	5.1	5.2	5.1	5.3
11	.....	.....	.....	6.6	7.2	5.0	4.65	4.6	5.5	5.0	5.15	5.7
12	.....	.....	.....	6.3	7.45	5.2	6.0	4.6	5.4	5.05	5.2	5.9
13	.....	.....	.....	6.0	5.7	6.1	7.0	4.3	5.5	5.5	5.1	6.3
14	.....	.....	.....	6.6	6.1	6.2	4.5	4.35	5.7	5.3	4.7	6.6
15	.....	.....	.....	6.1	7.4	6.4	5.9	4.4	5.6	5.15	4.7	7.2
16	.....	.....	.....	5.6	6.2	5.9	5.0	5.2	5.6	5.0	5.1	7.0
17	.....	.....	.....	5.85	7.5	5.7	5.0	4.3	5.4	5.3	5.2	7.15
18	.....	.....	.....	6.05	6.2	6.0	6.05	4.75	5.55	5.0	5.4	.....
19	.....	.....	.....	6.25	7.1	5.9	5.0	4.65	5.2	5.2	5.4	.....
20	.....	.....	.....	6.25	7.4	5.1	5.3	4.6	6.35	5.3	5.9	.....
21	.....	.....	.....	6.1	6.75	6.2	5.45	4.7	6.5	5.3	5.4	.....
22	.....	.....	.....	7.1	6.5	7.35	5.2	4.85	6.8	5.25	5.6	.....
23	.....	.....	6.9	6.1	7.0	6.25	5.2	4.3	6.8	4.95	5.6	.....
24	.....	.....	6.6	6.5	7.4	5.65	5.1	4.9	7.0	5.05	5.45	6.4
25	.....	.....	7.5	5.45	5.9	5.5	5.0	4.6	6.15	5.15	5.4	.....
26	.....	.....	7.5	6.0	8.0	6.05	5.2	4.7	6.1	5.1	5.4	.....
27	.....	.....	7.5	6.3	5.45	7.3	5.2	4.8	5.9	5.2	5.4	.....
28	.....	.....	7.75	6.4	5.0	7.4	5.1	4.8	6.0	5.0	5.4	.....
29	.....	.....	7.35	7.5	4.8	4.6	5.0	5.0	6.0	5.2	5.3	.....
30	.....	.....	7.25	6.1	4.7	7.9	5.1	5.05	6.1	5 1	5.2	.....
31	.....	.....	7.1	.....	4.8	.....	5.1	5.0	.....	5.15	.....	6.6
1908.												
1	.....	6.5	.....	5.7	8.6	6.0	5.4	5.0	4.7	5.1	5.5	5.5
2	.....	.....	.....	6.0	8.3	5.9	5.4	4.9	4.9	5.2	5.0	5.0
3	.....	.....	.....	6.1	8.2	5.7	5.6	5.1	5.1	5.2	5.1	5.7
4	.....	.....	.....	5.7	8.1	5.7	5.6	5.1	5.0	5.3	5.05	4.8
5	.....	.....	6.6	5.8	7.9	5.7	5.4	5.8	4.8	5.2	5.1	5.6
6	.....	.....	.....	6.1	6.7	5.3	6.2	5.0	4.9	5.1	5.1	7.0
7	.....	.....	.....	6.0	7.3	5.4	6 1	4.5	5.1	5.1	4.7	8.6
8	6.6	.....	.....	6.0	7.5	6.0	7.1	4.7	5 1	5.1	5.1	8.0
9	.....	.....	6.75	5.5	7.5	6.0	7.1	4.5	4.8	5.0	5.1	.....
10	.....	6.5	.....	5.5	7.6	5.5	7.1	4.3	4.8	5.0	5.0	.....
11	.....	.....	6.9	6.0	7.7	5.7	7.05	4.4	5.0	5.0	5.0	.....
12	.....	.....	.....	6.5	7.6	5.7	6.7	4.5	5.0	5.0	5.0	.....
13	.....	.....	.....	6.4	7.5	5.7	6.6	4.3	4.9	5.1	5.0	.....
14	6.6	.....	.....	6.5	6.6	5.7	6.3	4.6	4.9	5.0	5.0	.....
15	.....	.....	.....	6.3	6.5	5.7	5.8	4.4	5.0	4.9	5.0	7.0
16	.....	.....	.....	6.6	6.6	5.6	5.8	4.5	4.9	5.1	5.2	.....
17	6.3	.....	.....	6.5	6.8	5.7	5.4	4.5	4.8	5.1	5.4	.....
18	.....	6.7	.....	6.6	6.7	5.5	5.05	4.8	4.9	5.3	4.8	.....
19	.....	.....	.....	6.6	6.7	5.5	5.3	5.1	5.0	5.2	4.8	.....
20	.....	.....	.....	6.5	6.7	5.4	5.8	5.0	4.9	4.8	5.3	.....
21	.....	.....	6.8	6.5	6.7	5.2	6.0	5.0	4.9	4.9	5.2	.....
22	.....	.....	.....	6.1	6.8	5.2	5.8	5.0	5.2	5.2	5.0	7.3
23	6.6	.....	.....	6.6	6.3	5.3	5.6	5.0	4.9	5.2	5.0	.....
24	.....	.....	.....	6.3	6.5	5.9	5.6	5.1	4.8	5.0	5.2	.....
25	.....	.....	5.8	6.3	6.6	5.9	5.4	4.9	4.9	5.1	5.3	.....
26	.....	.....	5.8	6.5	6.4	5.9	5.5	5.0	4.9	5.2	5.4	.....
27	.....	.....	6.5	6.9	6.4	5.4	5.6	5.0	4.9	5.2	5.4	.....
28	.....	.....	6.7	7.2	6.3	5.0	5.6	4.9	4.9	5.15	5.5	.....
29	.....	6.7	5.7	8.4	6.0	5.5	5.4	5.0	5.1	5.2	5.5	6.8
30	.....	.....	6.5	8.5	6.1	5.5	5.3	5.1	5.1	5.2	5.5	.....
31	.....	.....	5.7	.....	6.0	.....	5.1	4.9	.....	5.2	.....	.....

NOTE.—Ice conditions prevailed from January 1 to about March 22 and during December, 1907, and from January 1 to about March 25 and during practically the whole of December, 1908. Gage readings to water surface in a hole in the ice during the frozen periods.

Rating tables for Oconto River near Gillett, Wis.

FOR 1906 AND 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
4.00	78	4.90	312	5.80	760	6.70	1,370
4.10	95	5.00	346	5.90	820	6.80	1,445
4.20	115	5.10	382	6.00	885	6.90	1,520
4.30	137	5.20	424	6.10	950	7.00	1,595
4.40	161	5.30	472	6.20	1,015	7.20	1,750
4.50	188	5.40	525	6.30	1,085	7.40	1,910
4.60	217	5.50	580	6.40	1,155	7.60	2,070
4.70	247	5.60	640	6.50	1,225	7.80	2,230
4.80	279	5.70	700	6.60	1,295	8.00	2,400

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 10 discharge measurements made during 1906 and 1907 and the form of the 1908 curve. It is well defined between gage heights 4.8 feet and 6 feet.

FOR 1908.

4.30	105	5.40	468	6.50	1,090	7.60	1,865
4.40	129	5.50	515	6.60	1,155	7.70	1,940
4.50	155	5.60	565	6.70	1,220	7.80	2,015
4.60	181	5.70	615	6.80	1,290	7.90	2,090
4.70	209	5.80	670	6.90	1,360	8.00	2,165
4.80	239	5.90	725	7.00	1,430	8.20	2,315
4.90	271	6.00	780	7.10	1,500	8.40	2,470
5.00	305	6.10	840	7.20	1,570	8.60	2,630
5.10	342	6.20	900	7.30	1,640		
5.20	382	6.30	960	7.40	1,715		
5.30	424	6.40	1,025	7.50	1,790		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 6 discharge measurements made during 1908 and the 1906 and 1907 curve. It is fairly well defined between gage heights 5 feet and 7.5 feet.

Monthly discharge of Oconto River near Gillett, Wis., for 1906, 1907, and 1908.

[Drainage area, 814 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1906.						
June 7-30	1,020	346	776	0.953	0.85	A.
July	982	161	504	.619	.71	A.
August	1,080	115	501	.615	.71	A.
September	982	312	570	.700	.78	A.
October	1,370	137	682	.838	.97	A.
November	1,870	217	957	1.18	1.32	A.
1907.						
March 23-31	2,190	1,300	1,810	2.22	.74	A.
April	1,990	552	1,160	1.43	1.60	A.
May	2,400	247	1,230	1.51	1.74	A.
June	2,320	95	844	1.04	1.16	A.
July	1,600	188	520	.639	.74	A.
August	640	137	291	.357	.41	B.
September	1,600	188	682	.838	.94	A.
October	790	279	474	.582	.67	A.
November	885	247	476	.585	.65	A.
December	.....	.....	331	.407	.47	D.
1908.						
January	.....	.....	317	.389	.45	D.
February	.....	.....	337	.414	.45	D.
March	1,220	.....	486	.597	.69	D.
April	2,550	515	1,050	1.29	1.44	A.
May	2,630	780	1,450	1.78	2.05	A.
June	780	305	575	.706	.79	A.
July	1,500	324	733	.900	1.04	A.
August	670	105	261	.321	.37	B.
September	382	209	285	.350	.39	B.
October	424	239	347	.426	.49	A.
November	515	209	364	.447	.50	A.
December	.....	.....	275	.338	.39	D.
The year	2,630	105	540	.663	9.05	

NOTE.—Ice conditions beginning about December 1, 1906. Discharge December, 1907, based on a measurement made December 13 under ice conditions. Discharge during the frozen period, January to March, 1908, based on five measurements made under ice conditions, which showed a relatively constant flow. Discharge December, 1908, is only a rough approximation.

WOLF RIVER DRAINAGE BASIN.

DESCRIPTION.

Wolf River rises in a number of small lakes in the western part of Forest County in northeastern Wisconsin, flows in a generally southerly direction, and empties into upper Fox River at a point about 10 miles west of Lake Winnebago. Though nominally a branch of Fox River, it is really the master stream, as it has over three times the discharge of the Fox. (See Pl. IV.)

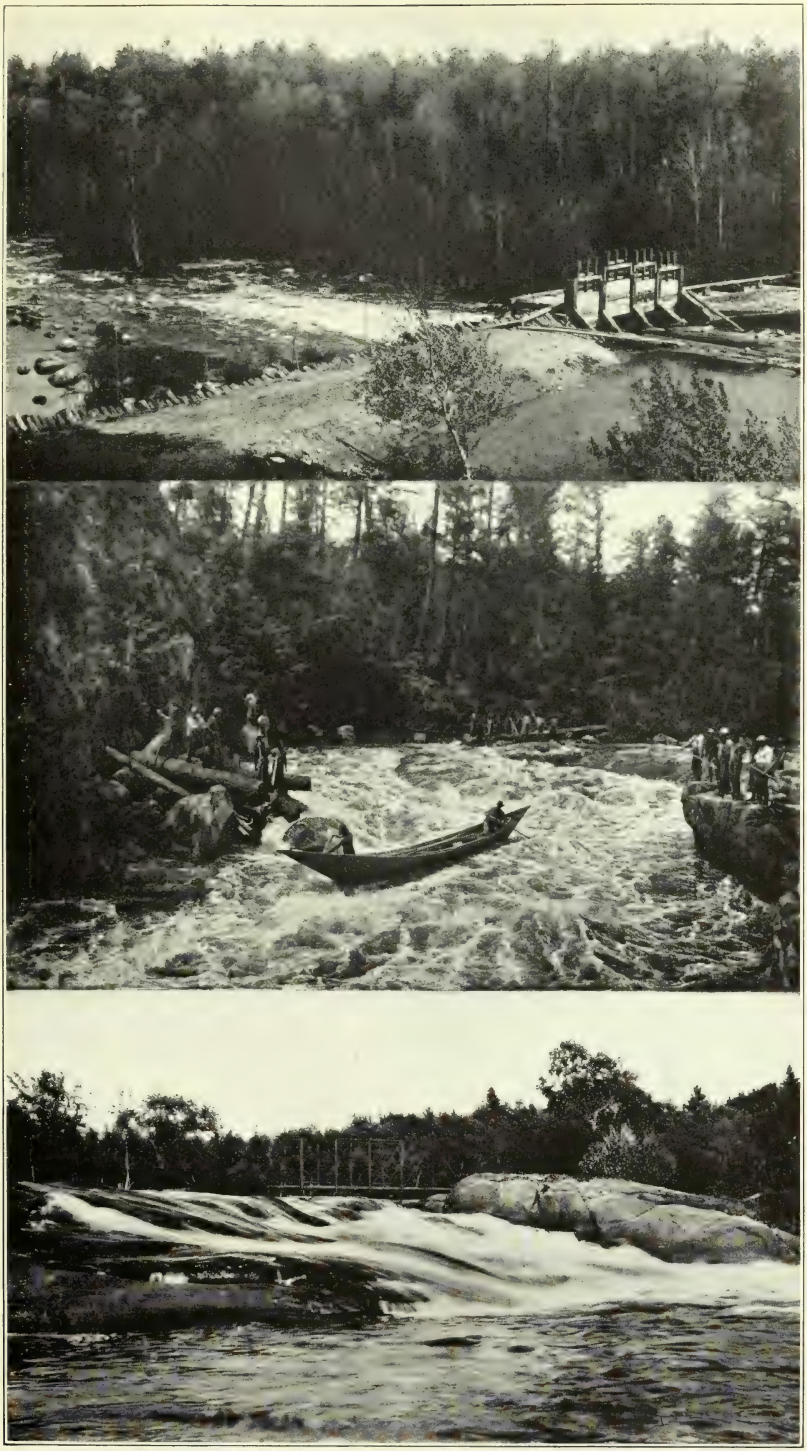
The river is about 180 miles long and its drainage area comprises about 3,600 square miles. All the largest tributaries are from the west, the more important ones (beginning at the source) being West Wolf, Red, Embarrass, Little Wolf, and Waupaca rivers.

The drainage basin is somewhat regular in outline—about 110 miles long with an average width of about 35 miles. Glacial action has modified the basins of many of the streams of northern Wisconsin, and the basin of Wolf River shows very prominently the effect of this action, as there is considerable evidence that formerly this river flowed westward and joined Mississippi River through the present Wisconsin River Valley between Portage and Prairie du Chien. In the upper half of its course the river flows over crystalline rocks and its descent is very rapid. At the Chicago and Northwestern Railroad crossing, 2 miles west of Lenox, the river has an elevation of 1,560 feet; in the 80 miles between this point and Shawano the river descends about 770 feet, or nearly 10 feet to the mile. This steep slope causes many rapids and falls. Shawano marks the point of transition from ancient crystalline rocks to sandstones, and here the river also crosses the old coast line of Lake Michigan and enters the region of red clay. Below Shawano, which is the head of navigation, the stream is sluggish, its descent being only 42 feet to Lake Winnebago, a distance of 80 miles. The banks are low, and in high water the adjoining flats are covered with water for several miles from the river.

The forestry conditions are similar to those elsewhere in Wisconsin. Lumbering has been carried on very extensively in the past and all the best timber has been cut off. At the present time the run of logs is small, and a great proportion of the timber is used for making paper pulp. Above Shawano the drainage basin is thinly settled, and the forestry conditions, as far as they affect the run-off of the river, are little changed, as a second growth has sprung up after the operations of the lumbermen.

The mean annual rainfall in this part of Wisconsin is about 32 inches. The winter conditions are severe; snowfall is comparatively heavy and lasts for considerable periods. Ice forms on the river from 1 to 2 feet in thickness and remains for about three months.

Storage possibilities have not been investigated, but the lakes and swamps in the basin must afford opportunities for making



THE DELLS OF WOLF RIVER, WISCONSIN.

reservoirs. The lumbermen have built numerous dams for holding water for flooding logs, and by increasing the height of these dams large reservoirs could undoubtedly be created.

Excellent sites for water power are numerous and their development awaits only a demand for power. A few power plants have already been put in operation. (Pl. V, *B*.)

The following stations have been maintained in this drainage basin:

Wolf River at Keshena, Wis., 1907 to 1908.
Wolf River at White House Bridge, near Shawano, Wis., 1906 to 1907.
Wolf River at Darrows Bridge, near Shawano, Wis., 1906.
Wolf River at Northport, Wis., 1905.
Wolf River at Winneconne, Wis., 1902 to 1903.
Little Wolf River near Northport, Wis., 1907 to 1908.

WOLF RIVER AT KESHENA, WIS.

This station, which is located at the highway bridge at Keshena, Wis., was established May 9, 1907, to obtain data for studying water power, water supply, and pollution problems, and for general statistical and comparative purposes.

West Wolf River enters about 3 miles above the station.

The winter conditions are severe, ice forming about 2 feet thick near the section. The stream is used considerably for logging, and there is a power plant above the station that may modify the flow in extreme low water.

The datum of the gage has remained unchanged. The records, except as noted above, are reliable and accurate.

Information in regard to this station prior to 1908, is contained in Bulletin No. 20 of the Wisconsin Geological and Natural History Survey, entitled "The water powers of Wisconsin," by Leonard S. Smith.

Discharge measurements of Wolf River at Keshena, Wis., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.	Thickness of ice.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*	*Feet.*
May 10	A. H. Horton	102	472	3.75	1,750	.....
June 22	G. A. Gray	105	308	1.82	666	.....
July 20	do	104	461	3.32	1,490	.....
August 24	do	107	277	1.48	568	.....
October 12	do	109	320	1.90	737	.....
Do	do	109	320	1.90	737	.....
November 8	do	109	385	2.50	1,010	.....
December 14 [a]	do	109	368	2.50	694	.....
1908.						
January 18 [b]	G. A. Gray	101	285	3.32	508	1.5
February 8 [b]	do	103	217	3.05	384	1.7
March 7 [b]	do	103	260	3.20	530	1.9
Do. [b]	do	103	260	3.20	528	1.9
April 21	do	103	520	4.02	1,920	.....
July 9	do	104	468	3.50	1,580	.....
September 17	do	108	243	1.10	414	.....

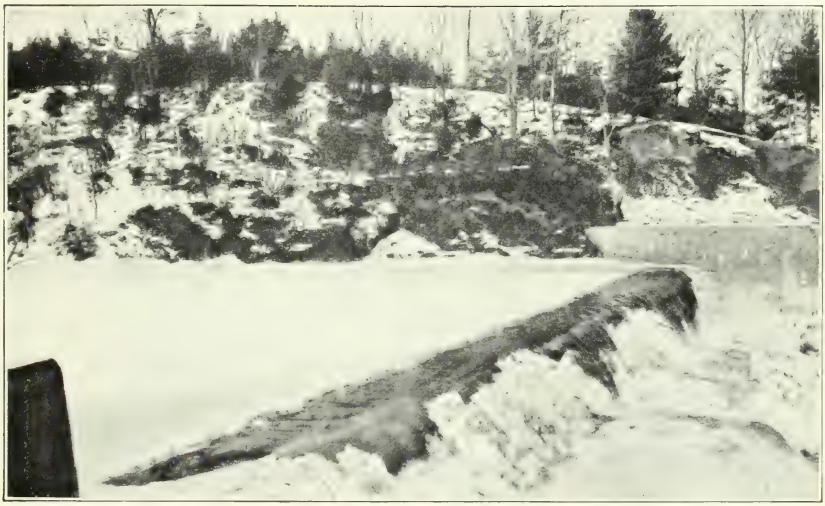
[a] Ice conditions; river half open and half frozen. [b] Dischage under ice conditions.

Daily gage height, in feet, of Wolf River at Keshena, Wis., for 1907 and 1908.

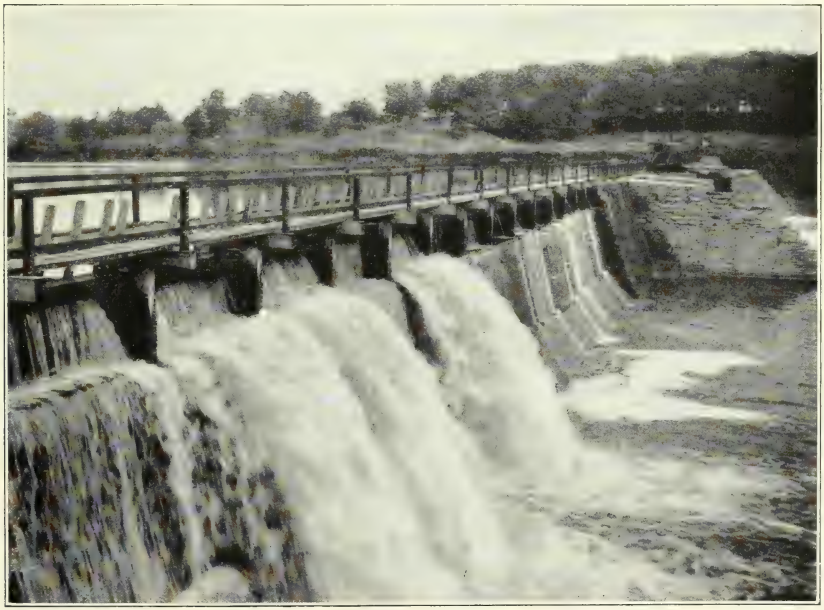
[Observer, Neil Gauthier.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						2.85	1.95	1.4	1.15	1.7	1.6	1.6
2						3.35	2.25	1.6	2.0	1.6	1.6	1.6
3						1.4	1.85	1.05	1.4	1.8	1.65	2.65
4						2.85	2.05	3.8	2.25	2.35	1.8	2.4
5						2.4	1.5	2.1	1.2	1.95	1.8	2.2
6						2.55	2.6	1.6	2.35	2.2	1.6	2.2
7						2.65	1.95	1.75	2.35	1.95	1.6	2.2
8						2.3	2.5	1.45	1.3	2.0	1.6	2.2
9						2.55	2.75	1.5	3.1	1.9	1.6	2.25
10					3.0	1.0	1.1	1.5	3.25	1.9	1.6	2.2
11					3.32	2.0	2.55	1.55	2.6	1.95	1.7	1.95
12					3.7	2.25	1.15	1.9	2.4	1.9	1.65	1.85
13					1.78	1.9	1.25	1.8	2.15	1.85	1.65	2.25
14					3.75	1.6	1.4	1.85	1.9	1.8	1.65	2.5
15					4.22	1.9	3.15	1.85	1.7	1.8	1.55	2.55
16					4.45	1.85	2.95	1.85	1.8	1.8	1.5	2.55
17					4.65	1.45	1.0	1.75	1.8	1.8	1.6	2.7
18					4.35	2.2	3.1	1.95	1.8	1.75	1.65	3.0
19					4.25	1.7	1.05	1.85	2.8	1.7	1.6	2.95
20					3.7	1.6	2.9	1.45	4.25	1.7	1.6	3.0
21					3.85	1.85	1.1	2.0	4.3	1.7	1.85	3.35
22					3.8	2.0	2.5	2.0	3.65	1.65	1.9	3.4
23					3.55	1.85	2.45	1.3	3.25	1.8	1.8	3.4
24					3.5	1.7	1.15	1.45	3.05	1.55	1.7	3.4
25					3.45	1.9	2.55	1.2	2.5	1.7	1.7	3.45
26					3.4	2.2	1.4	1.95	2.4	1.7	1.7	3.4
27					3.05	1.55	2.7	2.35	2.3	1.65	1.7	3.45
28					3.45	1.7	1.05	1.8	2.15	1.65	1.7	3.4
29					3.3	1.55	2.55	1.9	2.1	1.7	1.7	3.4
30					3.15	1.65	1.0	1.1	1.75	1.6	1.6	3.5
31					2.9		2.8	2.2		1.6		3.65
1908.												
1	3.75	3.00		2.60	4.38	2.80	2.30	1.70	1.48	2.48	1.60	1.72
2	3.80			2.58	3.95	2.67	2.15	1.62	1.42	2.50	1.42	1.85
3	3.80		3.00	2.52	3.75	2.62	2.12	1.65	1.38	1.78	1.62	1.70
4	3.80	3.00		2.40	3.10	2.70	2.05	1.45	1.38	1.75	1.48	2.05
5	3.80			2.60	2.90	2.40	2.30	1.50	1.32	1.72	1.50	1.18
6	3.80			2.42	2.40	2.40	2.35	1.45	1.45	1.68	1.40	1.85
7	3.75		3.20	2.50	2.55	1.85	2.67	1.45	1.32	1.70	1.30	2.08
8	3.70	3.05		2.47	2.75	2.70	4.00	1.58	1.28	1.58	1.35	1.18
9	3.70			2.52	2.90	2.57	4.15	1.50	1.28	1.55	1.45	1.28
10	3.70		3.20	2.50	2.25	2.70	3.45	1.45	1.25	1.50	1.42	2.15
11	3.65	3.10		2.70	2.55	2.55	3.15	1.42	1.25	1.65	1.35	2.18
12	3.65			2.65	2.55	2.55	2.82	1.48	1.25	1.52	1.38	2.12
13	3.60			2.45	2.30	2.45	2.50	1.45	1.30	1.42	1.45	2.22
14	3.55		3.40	2.60	2.10	3.65	2.35	1.42	1.28	1.32	1.50	2.20
15	3.55	3.30		2.95	2.32	2.72	2.35	1.35	1.25	1.38	1.55	2.22
16	3.45			2.63	2.95	2.40	1.85	1.42	1.28	1.32	1.35	2.18
17	3.45		3.20	3.30	2.80	1.60	1.90	1.60	1.08	.78	1.60	2.12
18	3.35	3.10		3.05	2.40	1.50	2.05	1.52	1.02	.82	1.45	2.10
19				3.35	3.05	1.70	2.02	1.45	1.30	1.32	1.78	2.12
20				2.60	3.02	1.75	2.02	1.48	1.30	1.22	1.75	2.12
21	3.30		3.00	3.50	2.97	1.67	2.05	1.42	1.25	1.15	1.65	2.10
22		3.00		3.06	3.32	1.70	1.95	1.40	1.22	1.20	1.50	2.18
23				2.80	3.40	2.00	1.95	1.42	1.00	1.52	1.55	2.20
24			3.10	2.85	3.55	2.00	2.00	1.45	1.10	1.78	1.68	2.10
25	3.20	3.00		3.30	3.35	2.00	1.95	1.35	.75	1.80	1.05	2.15
26				3.82	3.80	2.00	1.90	1.38	.70	1.60	1.15	2.18
27				4.20	3.15	1.90	2.00	1.32	.85	1.72	1.10	2.12
28	3.10		2.70	5.50	3.22	1.95	1.90	1.38	1.05	1.68	1.90	2.12
29		2.90		5.08	3.30	2.17	1.70	1.55	1.62	2.10	1.92	2.00
30			2.65	4.95	3.20	2.17	1.70	1.55	1.55	1.72	1.90	1.90
31			2.6		2.95		1.78	1.45		1.80		1.82

NOTE.—Ice conditions prevailed from about December 3 to 31, 1907, and from about January 1 to the end of March, 1908, and probably during the whole of December, 1908. Gage heights during the frozen periods are to water surface.



A. WINTER CONDITIONS AT INDIAN RAPIDS DAM ON SARANAC RIVER, NEAR PLATTSBURG, N. Y.



B. COMBINED LOCKS DAM, FOX RIVER, WISCONSIN.

Rating table for Wolf River at Keshena, Wis., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	275	1.80	695	2.90	1,222	3.90	1,853
.80	310	1.90	737	3.00	1,280	4.00	1,920
.90	346	2.00	780	3.10	1,340	4.20	2,055
1.00	383	2.10	824	3.20	1,401	4.40	2,191
1.10	421	2.20	869	3.30	1,463	4.60	2,330
1.20	459	2.30	915	3.40	1,526	4.80	2,474
1.30	497	2.40	962	3.50	1,590	5.00	2,620
1.40	536	2.50	1,010	3.60	1,655	5.20	2,767
1.50	575	2.60	1,060	3.70	1,721	5.40	2,915
1.60	614	2.70	1,112	3.80	1,787	5.50	2,990
1.70	654	2.80	1,166				

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on ten discharge measurements made during 1907 and 1908, and is well defined between gage heights 1.0 foot and 4 feet.

Monthly discharge of Wolf River at Keshena, Wis., for 1907 and 1908.

[Drainage area, 797 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
May 10-31	2,370	687	1,650	2.07	1.69	A.
June	1,490	383	798	1.00	1.12	A.
July	1,370	383	811	1.02	1.18	A.
August	1,790	402	694	.871	1.00	A.
September	2,120	440	988	1.24	1.38	A.
October	938	594	695	.872	1.01	A.
November	737	575	640	.803	.90	A.
December	.....	.....	600	.753	.87	C.
1908.						
January	.....	.....	510	.640	.74	D.
February	.....	.....	399	.501	.54	D.
March	1,090	.....	608	.763	.88	D.
April	2,990	962	1,360	1.71	1.91	A.
May	2,180	824	1,300	1.63	1.88	A.
June	1,690	575	911	1.14	1.27	A.
July	2,020	654	942	1.18	1.36	A.
August	654	505	564	.708	.82	A.
September	622	275	472	.592	.66	A.
October	1,010	303	612	.768	.89	A.
November	746	402	578	.725	.81	A.
December	.....	.....	450	.565	.65	D.
The year	2,990	275	726	.910	12.41	

NOTE.—Discharge during the frozen period 1907 and 1908, estimated on the basis of five measurements made under ice conditions and climatological reports. Discharge December, 1908, is only a rough approximation.

WOLF RIVER NEAR SHAWANO, WIS.

This station, which is located at the highway bridge known as the White House bridge, about 3½ miles north of Shawano, was established to obtain data for use in studying water power, water supply, and navigation problems.

The station is one-fourth mile above the mouth of Red River. The drainage area above the section is about 810 square miles.

The winter conditions are severe in this locality, ice forming of considerable thickness and lasting three to four months.

Backwater from Red River and from a dam about 4 miles below the station may affect the gage heights, otherwise the records are reliable and accurate.

The datum of the gage has remained unchanged.

This station was discontinued May 31, 1907, as it was concluded that backwater from the dam affected the gage heights, the station at Keshena taking its place.

Information in regard to this station is contained in Bulletin No. 20 of the Wisconsin Geological and Natural History Survey, entitled "The water powers of Wisconsin," by Leonard S. Smith.

Daily gage height, in feet, of Wolf River near Shawano, Wis., for 1907.

[Observer, Albert Utke.]

Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.	Day.	Mar.	Apr.	May.
1	.....	7.0	6.8	11	.....	6.7	7.1	21	.....	6.5	7.3
2	.....	7.0	6.5	12	.....	6.9	7.1	22	.....	6.1	6.9
3	.....	7.0	7.4	13	.....	7.0	5.6	23	.....	6.0	6.8
4	.....	7.0	6.8	14	.....	7.0	7.5	24	.....	6.6	7.0
5	.....	6.9	6.8	15	.....	7.1	7.2	25	7.5	6.8	7.0
6	.....	7.1	5.9	16	.....	6.7	7.2	26	7.7	6.6	7.0
7	.....	7.1	7.1	17	.....	6.6	7.0	27	7.6	6.6	6.7
8	.....	6.8	7.1	18	.....	6.8	6.6	28	7.7	6.6	7.4
9	.....	6.4	7.0	19	.....	6.6	6.6	29	8.0	6.6	7.5
10	.....	6.2	6.7	20	.....	6.5	6.5	30	7.9	6.6	6.8
								31	7.9	.....	6.8

LITTLE WOLF RIVER NEAR NORTHPORT, WIS.

This station, which is located at the highway bridge known as Phillips bridge, about 3 miles southwest of Northport, Wis., in the southeastern part of sec. 8, T. 22 N., R. 14 E., was established October 13, 1907, to obtain data for use in studying water power problems.

The station is about 3 miles from Wolf River.

The drainage area above the section is about 460 square miles.

The ice conditions are those that prevail generally throughout the basin, the stream being covered with ice 1 to 2 feet in thickness for a period of about three months.

The datum of the gage has remained unchanged. The records are reliable and accurate.

The station was established and is maintained by D. W. Mead, who furnishes the records.

Information in regard to this stream is contained in Bulletin No. 20 of the Wisconsin Geological and Natural History Survey, entitled "The water powers of Wisconsin," by Leonard S. Smith.

Discharge measurements of Little Wolf River near Northport, Wis., in 1907 and 1908.

Date.	Hydrographer.	Gage height.	Discharge.
1907.		*Feet.*	*Sec.-ft.*
October 13	V. H. Reineking	1.40	214
October 16	Henry J. Hunt	1.54	215
October 27	do	1.45	217
1908.			
March 20[a]	V. H. Reineking	5.00	930
March 21[a]	do	4.20	617
March 22[a]	do	4.90	869
March 23[a]	do	4.90	881
March 24	do	4.30	805

[a] Measurement made under ice conditions.

Daily gage height, in feet, of Little Wolf River near Northport, Wis., for 1907 and 1908.

[Observer, A. N. Garrow.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1907.				1907.				1907.			
1	.....	1.4	2.0	11	.....	2.0	3.0	21	3.2	1.7	2.0
2	.....	1.6	2.1	12	.....	1.4	3.1	22	1.3	1.7	2.6
3	.....	1.6	1.8	13	1.5	1.6	2.8	23	1.4	1.8	2.7
4	.....	1.7	1.8	14	2.0	1.6	2.7	24	1.3	2.0	2.6
5	.....	1.5	2.0	15	1.4	1.5	1.9	25	1.3	1.7	1.9
6	.....	1.9	1.7	16	1.4	1.7	2.0	26	1.5	1.8	1.8
7	.....	1.3	1.9	17	1.5	1.5	1.9	27	1.3	1.9	1.7
8	.....	1.5	1.8	18	1.4	1.5	1.8	28	1.6	1.8	1.8
9	.....	1.8	2.4	19	1.4	1.6	1.7	29	1.4	1.8	1.9
10	.....	1.4	3.0	20	1.4	1.4	1.8	30	1.3	1.7	2.0
								31	1.5	.....	2.0

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
1	2.2	2.3	2.8	3.2	4.6	2.5	1.5	2.5	1.3	1.5	1.2	1.1
2	2.4	2.1	2.9	2.9	4.3	2.2	1.4	1.3	1.2	1.3	1.3	2.1
3	2.5	2.1	2.7	2.8	4.0	2.2	1.5	1.4	1.3	1.4	1.2	2.4
4	2.4	2.1	2.7	2.9	3.8	2.0	1.4	1.4	1.3	1.3	1.4	2.2
5	2.0	2.2	2.8	2.7	3.5	1.7	1.8	1.3	1.2	1.4	1.2	2.2
6	1.9	2.2	3.0	3.2	3.5	1.6	3.5	1.4	1.2	1.2	1.1	2.3
7	1.8	2.3	3.4	3.1	3.4	1.5	4.4	1.3	1.2	1.2	1.2	2.1
8	1.6	2.4	3.9	3.0	3.3	1.7	4.7	1.4	1.1	1.2	1.2	2.0
9	1.7	2.4	3.7	3.1	3.0	1.7	5.3	1.4	1.1	1.2	1.1	1.9
10	1.7	2.4	4.5	3.0	2.8	1.6	4.7	1.3	1.1	1.3	1.7	2.0
11	1.6	2.5	5.0	3.0	2.8	1.7	4.0	1.3	1.1	1.1	1.5	1.9
12	2.0	2.6	5.7	3.0	2.7	1.8	2.8	1.3	1.1	1.1	1.2	1.9
13	2.0	2.7	6.6	3.2	2.8	1.8	3.1	1.3	1.0	1.4	1.2	1.9
14	1.9	2.7	6.4	3.0	2.9	1.6	3.0	1.3	1.0	1.3	1.1	2.0
15	2.2	3.1	6.1	3.0	3.4	1.5	2.6	1.2	1.1	1.3	1.7	2.0
16	2.1	3.2	5.8	3.0	3.5	1.4	2.5	1.3	1.1	1.2	1.8	2.0
17	2.0	3.1	5.9	3.0	2.7	1.4	2.4	1.5	1.0	1.1	1.8	2.0
18	2.1	3.0	5.6	2.9	2.4	1.4	2.0	1.4	1.0	1.1	1.7	2.1
19	2.0	2.7	5.3	2.7	3.0	1.4	2.8	1.4	1.0	1.1	1.4	2.0
20	2.0	2.7	5.0	2.5	3.0	1.3	2.7	1.4	1.1	1.1	1.1	2.1
21	2.3	2.6	4.1	3.0	2.8	1.3	2.9	1.4	1.1	1.5	1.3	2.1
22	2.2	2.7	3.8	2.8	2.7	1.3	1.6	1.4	1.1	1.1	1.1	2.0
23	1.9	2.7	4.9	2.5	3.0	1.5	1.7	1.4	1.1	1.1	1.2	2.0
24	1.8	2.7	4.8	2.6	2.8	1.6	1.6	1.3	1.1	1.1	1.2	2.0
25	1.8	2.8	3.8	3.0	3.0	1.4	1.5	1.3	1.1	1.2	1.3	2.0
26	2.0	3.0	3.5	2.9	2.8	1.3	2.5	1.3	1.1	1.8	2.1	2.0
27	2.1	2.7	3.3	4.6	2.7	1.5	2.5	1.2	1.1	1.7	2.0	2.0
28	2.1	2.6	3.2	4.9	2.7	1.3	2.4	1.2	1.1	1.4	1.4	1.9
29	2.1	2.5	3.2	5.0	2.6	1.4	2.5	1.2	1.2	1.2	1.9	2.0
30	2.1	.....	3.4	4.9	3.0	1.3	2.4	1.1	1.3	1.6	1.8	2.0
31	2.2	.....	3.2	.....	2.6	.....	2.4	1.1	.....	1.4	.....	2.0

NOTE.—Ice conditions probably prevailed during the greater part of December, 1907.
Ice conditions prevailed from about January 1 to March 23 and probably during the greater part of December, 1908.

KALAMAZOO RIVER DRAINAGE BASIN.

DESCRIPTION.

Kalamazoo River is formed by the junction of the North and South branches at Albion, in the eastern part of Calhoun County, in south-central Michigan. The two branches are each about 20 miles in length. The river flows in a general northwesterly direction into Lake Michigan.

There are no important tributaries. The length of the river below Albion is 101 miles. The total drainage area is about 2,000 square miles.

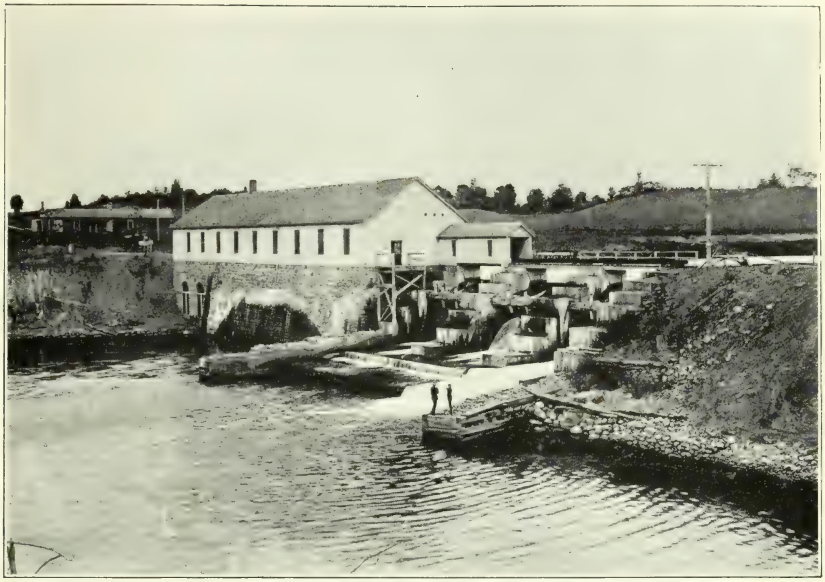
The drainage basin is overlain with glacial deposits which are thinnest near the sources of the river. The surface formations are distributed as follows: Morainal ridge and glacial drift cover between 25 and 45 per cent of the drainage area; clay-loam till plains, 25 to 35 per cent; overwash valley train deposits of the ice drainage, 35 to 45 per cent. The surface of the drainage basin is rolling. Prairie, swamp, and hilly stretches alternate at short intervals. The current of the river is swift, averaging about 3 miles an hour, and its slope uniform, there being no waterfalls and no considerable rapids except at two points, at each of which there occurs a descent of 3 or 4 feet within a distance of a few rods. The river flows through a rich agricultural region, in a valley from one-fourth of a mile to 2 or 3 miles in width, backed by low hills or sloping gently to the upland. The flat lands in the valley through which the river winds in a tortuous manner are often flooded. There are within the drainage basin a large number of small lakes and spring hollows, in which water stands part or all of the time. Many of these have no surface outlets and feed the stream only through seepage or ground flow.

The elevation of the river at Albion is 919 feet; at Battle Creek, about 800 feet; at the mouth the elevation, 581 feet.

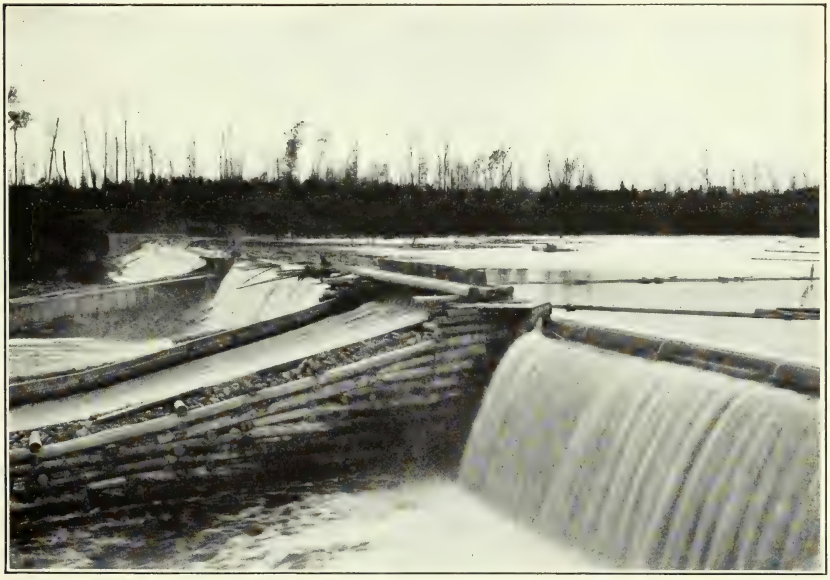
Only about 10 per cent of the drainage basin is forested. The mean annual rainfall is about 34 inches. The winter conditions are comparatively mild; snowfall is not heavy; ice forms on the streams about 1 foot in thickness.

Some opportunities for storage are found in this basin, but the high value of land for agricultural purposes prohibits the construction of reservoirs.

On account of the uniform flow this stream is of great value for water-power development (Pl. VI, *A*). All of the better power sites have been developed, one company alone having developed about 9,500 horsepower at six dams. Springs issuing from galcial moraines or breaking through the underlying sandstone from the great artesian basin of the State supply the river with a considerable body of water.



A. TROWBRIDGE DAM AND POWER HOUSE, KALAMAZOO RIVER, ALLEGAN, MICH



B. FLETCHER DAM, THUNDER BAY RIVER, ALPENA, MICH., IN 1902.

The following gaging stations have been maintained in this drainage basin:

Kalamazoo River at Kalamazoo, Mich., 1900 to 1901.
Kalamazoo River near Allegan, Mich., 1901 to 1908.
Reed's Spring at Albion, Mich., 1904 to 1906.

KALAMAZOO RIVER NEAR ALLEGAN, MICH.

This station, which is located at the power plant of the Commonwealth Power Company, 6 miles upstream by the river from Allegan, Mich., was established April 4, 1901, to obtain data for use in studying water power, water supply, and pollution problems.

There are no tributaries of any size near the station.

The entire flow of the river at this point passes through the turbines except in times of high water, when the extra flow is released by means of Taintor gates. The discharge is computed from a record kept of the run of the turbines and of the Taintor gate openings. The computed data, if the records are accurately and carefully taken, and if the flow through the wheels as they are set up agrees with the manufacturer's rating, should be excellent, as the records and computations are simple. Ice does not affect the computation of the discharge, although it forms a foot or so in thickness on the pond above the dam. The records at this station have been furnished by employees[a] of the Commonwealth Power Company. The 1908 data were not computed owing to repairs and alterations to the Taintor flood gates.

Daily discharge, in second-feet, of Kalamazoo River near Allegan, Mich., for 1907.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,570	1,510	1,300	3,520	2,320	1,400	774	1,030	[b] 370	1,270	726	[b] 900
2	1,380	1,560	1,190	3,440	2,170	[b] 1,030	963	719	717	1,060	1,100	900
3	1,700	[b] 1,270	[b] 1,560	2,940	2,310	1,220	963	592	409	1,270	[b] 1,280	924
4	1,570	1,470	1,310	2,580	2,480	1,190	879	[b] 477	562	1,460	1,280	1,100
5	1,630	1,300	1,750	2,350	2,670	1,260	801	1,100	655	1,340	1,630	338
6	[b] 1,610	1,130	1,420	1,090	2,270	1,450	1,210	683	501	[b] 1,200	1,240	612
7	1,670	1,200	1,600	[b] 882	1,800	1,160	[b] 719	790	578	1,330	997	719
8	2,430	1,160	1,280	1,620	1,630	1,370	1,080	971	[b] 489	1,100	785	[b] 712
9	2,080	1,280	1,400	1,940	1,710	[b] 1,150	1,130	933	1,330	998	785	1,160
10	1,780	[b] 1,090	[b] 845	1,570	1,260	1,190	780	716	1,220	1,250	[b] 616	1,780
11	1,710	1,360	1,320	1,810	1,410	1,190	876	([b])	1,120	1,030	1,240	1,670
12	1,990	1,300	1,260	1,540	[b] 1,340	1,300	900	588	414	725	997	1,510
13	[b] 2,020	1,250	1,450	1,580	1,380	1,250	1,250	635	490	[b] 1,060	1,060	1,600
14	1,600	1,000	1,620	[b] 1,410	1,020	1,060	[b] 1,120	889	545	1,220	1,100	1,460
15	1,700	1,240	1,440	1,210	1,220	859	1,380	1,030	[b] 288	918	568	[b] 1,380
16	1,450	1,240	1,820	1,310	1,190	[b] 954	1,250	714	718	800	1,020	1,300
17	1,270	[b] 1,410	[b] 1,800	1,380	1,080	1,130	1,300	684	1,030	763	[b] 819	1,270
18	1,350	1,470	1,590	1,260	911	1,240	1,160	([b])	1,330	900	963	1,100
19	1,610	1,870	1,680	1,180	[b] 1,220	1,190	1,410	909	735	1,100	726	1,190
20	[b] 3,520	1,870	1,600	1,170	859	1,000	1,060	970	1,050	[b] 578	924	734
21	2,200	1,380	1,520	[b] 1,170	1,250	731	[b] 182	840	1,220	1,220	971	757
22	2,330	1,300	1,640	1,010	1,300	529	1,030	361	[b] 1,060	879	1,320	[b] 1,060
23	1,790	1,300	1,640	1,290	1,220	[b] 932	1,160	493	988	879	1,250	1,120
24	1,910	[b] 866	[b] 2,450	1,130	1,190	1,210	1,220	531	1,100	1,100	[b] 733	997
25	2,080	1,310	1,820	1,430	1,410	1,270	765	[b] 687	719	918	1,150	851
26	1,940	1,270	1,940	1,130	[b] 1,510	1,100	1,250	1,080	699	1,050	1,080	1,380
27	[b] 1,440	1,330	2,040	1,050	1,800	971	1,220	323	836	[b] 848	1,100	2,080
28	1,600	1,300	2,570	[b] 888	1,740	1,270	[b] 634	670	1,160	900	984	3,400
29	1,480	.....	2,980	918	1,710	900	660	687	[b] 1,190	972	1,030	[b] 2,770
30	1,530	.....	3,340	2,200	820	[b] 856	1,030	361	1,320	862	1,240	2,360
31	1,590	.....	[b] 3,240	.....	1,370	.....	647	874	.....	854	.....	2,370

[a] Danner and Harrington. [b] Sunday.

Monthly discharge of Kalamazoo River near Allegan, Mich., for 1907.

[Drainage area, 1,470 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	3,520	1,270	1,820	1.24	1.43
February	1,870	866	1,320	.898	.94
March	3,340	845	1,760	1.20	1.38
April	3,520	882	1,630	1.11	1.24
May	2,670	820	1,530	1.04	1.20
June	1,450	529	1,110	.755	.84
July	1,410	182	994	.676	.78
August (29 days)	1,100	323	736	.501	.54
September	1,330	288	828	.563	.63
October	1,460	578	1,030	.701	.81
November	1,630	568	1,020	.694	.77
December	3,400	338	1,340	.912	1.05

GRAND RIVER DRAINAGE BASIN.

DESCRIPTION.

Grand River rises in the southern part of Jackson County, in the southeast-central part of Michigan, flows northward to Lansing, thence northwestward to the central part of Ionia County, and finally westward to Grand Haven, Mich., where it enters Lake Michigan. Its length, not following the bends and angles, is about 200 miles, and its total length is at least 300 miles. The important tributaries are as follows, beginning at the source: From the right, Portage, Red Cedar, Lookingglass, Maple, Flat, and Rogue rivers; from the left there is only one of any size—Thornapple River. The total drainage area is about 5,570 square miles, which makes it the largest stream in Michigan.

The drainage basin is fairly regular in outline and shape. It lies in the southern border of the pine belt and is for the most part cleared, and is now thickly settled, having become a rich agricultural region. The drainage area is comparatively flat, being overlain with glacial drift with outcroppings of rock at rare intervals. At Grand Rapids the stream passes over a limestone ledge, making a considerable fall at Grand Ledge. About 12 miles west of Lansing a similar descent occurs over sandstone. Below Grand Rapids the flow is very sluggish. In the upper half of this stretch the immediate banks of the river are high in places forming natural levees. Below Lamont bayous and swamps are common between the river banks and the foothills bordering the valley. The valley of the river proper is narrow; gravel bluffs from 50 to 60 feet high stand close to the stream in some places. The northwestern and southeastern portions of the drainage basin are thickly interspersed with small lakes, a number of which have no surface outlet. The elevation of the sources of the river is about 1,000 feet; at Lansing the elevation

is about 820 feet; at Grand Rapids it is about 590 feet; at the mouth of the river the elevation is 581 feet; the total descent is therefore about 400 feet, which produces a rather low average fall.

There are no forested areas of any extent in this drainage basin, all timber having been cut off some time ago.

The mean annual rainfall is from 30 to 35 inches. The winter conditions are comparatively mild; in general the snowfall is not heavy, and ice does not form very thick.

Storage possibilities have not been investigated, but it is thought that some of the lakes and swamps may make good-sized reservoirs by means of dams of ordinary height.

At the present time there is about 5,000 horsepower developed on the main stream and tributaries, counting only power plants of some size. The stream is therefore of considerable value for water power, and there are power sites still undeveloped.

Grand Rapids is at the head of navigation on the Grand River.

The following gaging stations have been maintained in this drainage basin:

Grand River at North Lansing, Mich., 1901–1906.
Grand River at Grand Rapids, Mich., 1901–1908.[a]
Red Cedar River at Agricultural College, Mich., 1902–3.
Crockery Creek at Slocums Grove, Mich., 1902–3.

GRAND RIVER AT GRAND RAPIDS, MICH.

This station, which is located at the Fulton Street Bridge in the city of Grand Rapids, Mich., was installed March 12, 1901, to obtain data for studying water supply, flood control, pollution, and navigation problems, and for general statistical and comparative studies.

The drainage area above the station is about 4,900 square miles.

Ice forms in winter and changes the relationship between gage heights and discharge. Power plants above the section modify the low-water flow.

In November, 1907, a new staff gage was installed whose zero corresponded with the city datum. Readings taken on this gage were first reported in December, 1907. The zero of the gage in use prior to November, 1907, was 0.55 foot below the city datum; all gage readings, however, have been corrected to the city datum, and all published gage heights are therefore referred to the same datum. The records are reliable and accurate. Only two or three measurements have been taken at this station since 1905. These measurements appear to indicate that the 1905 discharge table does not hold after that year and therefore estimates of the flow have not been computed for later years.

[a] Also gage-height records on the Grand River at the Chicago and West Michigan Railroad bridge, Grand Rapids, Mich., 1897–1900.

The following discharge measurement was made October 21, 1908: Width, 481 feet; area, 675 square feet; gage height, —0.64 foot; discharge, 1,500 second-feet.

Daily gage height, in feet, of Grand River at Grand Rapids, Mich., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.95	9.95	3.25	7.75	5.10	1.85	0.12	0.10	.....	0.75	.....	.....
2	3.00	9.65	5.75	7.70	6.30	.....	−.05	.12	.....	.75	.....	0.15
3	3.50	.....	.....	7.00	7.10	1.23	−.05	.05	−0.40	.85	.....	.42
4	3.80	9.25	6.20	8.05	7.50	1.35	−.12	.....	.10	1.10	.....	−.02
5	3.70	8.95	6.25	4.75	.....	1.20	−.15	−.22	−.18	.85	.....	−.18
6	.....	8.75	5.85	3.90	7.03	1.15	−.20	−.30	−.35	.....	.....	−.06
7	3.75	8.25	5.30	.....	6.30	1.25	.....	−.20	−.30	.85	.....	.08
8	5.30	7.95	4.90	3.40	5.40	.97	−.12	−.22	.....	.90	.....	.....
9	6.30	7.55	4.40	3.45	4.57	.....	−.15	−.05	−.28	.85	.....	.10
10	6.35	.....	.....	3.20	3.75	.87	−.25	−.32	−.12	.45	.....	1.10
11	6.45	7.00	3.25	3.10	3.25	.90	−.10	.....	−.05	.30	.....	1.68
12	6.55	6.70	4.35	2.80	.....	.90	−.12	−.40	.00	.05	.....	1.92
13	.....	6.35	6.00	2.75	2.45	.80	−.10	−.32	.08	.....	.....	1.75
14	5.40	6.00	6.50	.....	2.35	.75	.....	−.40	−.20	.40	.....	.65
15	4.70	5.85	7.05	2.50	2.00	.70	.15	−.45	.....	.05	.....	.....
16	4.20	5.60	7.50	2.55	1.65	.....	.68	−.28	−.40	−.05	.....	.45
17	3.10	.....	.....	2.50	1.60	.40	.45	.35	−.05	−.20	.....	.90
18	2.95	5.50	6.55	2.37	1.45	.40	.72	.....	.30	−.05	.....	.82
19	6.40	5.90	6.60	2.35	.....	.37	.15	−.38	.55	−.35	.....	1.18
20	.....	6.15	6.65	2.10	1.15	.33	.10	−.35	.65	.....	.....	.82
21	9.90	6.15	6.50	.....	1.15	.35	.....	−.35	.50	−.10	.....	.50
22	10.30	6.05	6.50	1.87	1.23	.35	1.82	−.10	.....	.30	.....	.75
23	12.90	5.65	6.20	1.77	1.15	.....	2.28	−.35	−.05	.05	.....	.92
24	15.10	.....	.....	1.33	1.15	.33	2.30	−.38	−.18	.....	.....	.50
25	12.65	5.00	6.70	1.25	.90	.50	2.12	.....	−.20	.....	.....	.....
26	11.45	4.60	7.60	1.23	.....	.93	2.02	−.40	−.22	.....	.....	.50
27	10.15	4.00	8.05	1.35	1.35	1.20	1.72	−.38	−.35	.....	.....	1.55
28	10.00	3.35	8.10	.....	2.15	.95	.....	−.40	.10	.....	.....	3.20
29	9.70	.....	7.90	1.35	2.37	.55	.42	−.38	.....	.....	.....	.....
30	9.65	.....	7.60	3.13	2.10	.....	.35	−.42	.40	.....	.....	4.95
31	9.65	.....	.....	.....	1.95	.....	.28	−.50	.....	.....	.....	5.10
1908.												
1	5.35	2.50	.....	10.20	3.62	7.40	−0.22	−0.58	−0.55	−0.50	.....	0.58
2	5.00	.....	4.10	9.75	2.82	7.32	−.22	.....	−.60	−.60	−0.60	.43
3	4.77	2.75	3.90	9.10	.....	6.95	−.80	−.78	−.62	−.55	−.65	.10
4	.....	2.38	3.60	8.40	2.45	5.75	.....	−.62	−.62	.....	−.55	.10
5	.....	2.25	3.35	.....	2.20	4.50	.....	−.65	−.65	−.60	−.55	.00
6	3.60	2.15	3.65	6.90	2.00	4.00	−.10	−.55	.....	−.62	−.58	.....
7	3.42	2.25	7.28	6.15	2.05	.....	−.25	−.55	.....	−.55	−.58	−.40
8	3.38	2.22	8.40	6.35	3.85	2.65	−.20	−.55	−.70	−.62	.....	−.50
9	2.72	.....	9.02	6.55	5.00	2.32	−.38	.....	−.70	−.62	−.55	−.40
10	2.32	2.00	9.90	6.70	.....	1.70	−.35	−.60	−.75	−.58	−.68	−.40
11	2.30	1.38	11.65	6.58	5.45	1.30	−.38	−.65	−.75	.....	−.50	−.55
12	.....	1.70	13.80	.....	6.20	1.10	.....	−.65	−.78	−.65	−.50	−.60
13	2.05	2.70	14.35	.....	6.35	.95	−.52	−.72	.....	−.62	−.45	.....
14	1.60	3.50	14.80	.....	7.10	.....	−.38	−.75	−.85	−.52	−.55	−.60
15	1.30	4.75	15.30	.....	8.00	1.25	−.40	−.75	−.85	−.55	.....	−.35
16	1.15	.....	15.30	.....	.....	1.02	−.60	.....	−.90	−.55	−.68	−.45
17	1.15	5.85	14.82	3.30	.....	.70	−.55	1.30	−.85	−.60	−.50	−.40
18	1.05	6.05	13.95	3.20	10.22	.50	−.55	1.10	−.75	.....	−.52	−.30
19	.....	6.50	12.90	.....	10.25	.40	.....	1.00	−.75	−.60	−.45	−.05
20	1.00	6.40	11.90	3.40	9.72	.35	−.50	.80	−.70	−.60	−.50	.....
21	1.28	6.30	10.75	3.10	9.00	.....	−.25	.48	−.70	−.60	−.50	−.35
22	1.20	.....	.....	2.95	7.90	.05	−.40	.28	−.72	−.50	.....	−.50
23	1.10	.....	9.05	2.50	7.30	−.12	−.50	.....	−.78	−.35	−.58	−.60
24	.90	5.10	8.33	3.25	.....	.02	−.45	.05	−.75	−.50	−.45	−.40
25	1.60	4.95	7.62	3.25	5.30	−.20	−.40	−.12	−.82	.....	−.25	.....
26	.....	4.90	7.12	.....	5.35	−.15	.....	−.35	−.78	−.50	−.40	−.40
27	1.60	4.60	6.55	3.60	5.70	−.20	−.50	−.52	.....	−.45	−.20	.....
28	1.75	4.60	7.30	4.35	5.85	.....	−.45	−.38	−.70	−.42	−.18	−.50
29	1.75	4.32	.....	4.35	6.20	−.25	−.50	−.60	−.70	−.55	.....	−.50
30	1.38	.....	9.10	4.00	.....	−.12	−.60	.....	−.60	−.55	−.13	−.45
31	1.20	.....	10.00	.....	.....	.....	−.65	−.60	.....	.....	.....	−.55

MANISTEE RIVER DRAINAGE BASIN.

DESCRIPTION.

Manistee River rises in several lakes along the boundary line between Antrim and Otsego counties in the north-central part of Michigan, flows southwestward across Kalkaska, Wexford, and Manistee counties, and empties into Lake Michigan at Manistee, Mich. It has but two important tributaries, both of which enter in the lower part of the river—Big Bear on the right bank, and the South Branch of the Manistee on the left bank. The length of the river is about 110 miles, not taking into account the numerous bends and angles; but following its windings, its total length must be about 200 miles, for it is very crooked. The total drainage area is about 2,120 square miles.

The drainage basin is somewhat irregular in shape, the upper part being narrow, the widest portion being found in the lower third of the basin. The soil of the drainage basin is sandy and the stream receives a large proportion of its supply from springs along the banks of the main river and its tributaries. The country is flat or rolling. The elevation of the sources of the river is about 1,200 feet, the elevation of the mouth is 581 feet, a total fall of 620 feet.

Practically all the better timber has been cut off this drainage basin, although lumbering is still carried on to some extent.

The mean annual rainfall is about 35 inches. The winter conditions are not severe; there is a fairly heavy fall of snow, ice forms on the river about 1 foot in thickness during severe cold spells. The large amount of spring water helps to keep the river open.

Storage possibilities have not been investigated, but as the basin contains numerous lakes, it must afford conditions for creating reservoirs to conserve and regulate the flow.

The opportunities for water power have not been fully investigated. Good sites, however, must be available at various places, as the fall of the river is considerable and the flow is well sustained during dry spells by the numerous springs.

The stream is used considerably for logging, but the lumber interests are becoming less every year.

One gaging station has been maintained in this drainage basin: Manistee River near Sherman, Mich., established July 10, 1903, and maintained to date.

MANISTEE RIVER NEAR SHERMAN, MICH.

This station, which is located at North Bridge, about 1 mile from Sherman, Mich., was established July 10, 1903, to obtain data for studying water power, water supply, and pollution problems.

Wheeler Creek enters immediately below the station.

The river freezes over in winter, making necessary special studies to determine the winter flow. The constancy of flow of this stream, as shown by the tables given below, is remarkable and is due to springs and ground-water flow. The maximum recorded mean flow for any month from 1903 to 1908 is only 2½ times the minimum recorded mean flow. It has consequently been possible to estimate the discharge during the frozen periods fairly closely by taking advantage of these facts and by utilizing climatologic data. The stream is used for logging, and at times there are sunken logs in the bed of the stream which may affect the gage heights slightly.

The datum of the gage has remained unchanged; the records are reliable and accurate except as conditions noted above may affect the readings.

Discharge measurements of Manistee River near Sherman, Mich., in 1903–1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1903.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 4	W. M. Gregory		344		935
July 10	do		368	2.45	1,040
July 24	do		358	2.55	1,060
Do	Horton and Gregory		354	2.49	1,050
August 26	W. M. Gregory		347	2.30	994
1904.					
June 2	C. C. Covert		538	3.62	1,510
September 13	H. R. Beebe		335	2.05	921
September 16	do		359	2.05	912
Do	do		359	2.06	907
December 14	C. C. Covert		362	1.76	860
1905.					
June 4	H. R. Beebe	67	441	2.65	1,130
November 8	E. F. Weeks	67	456	2.70	1,230
1906.					
June 20	Horton and Covert	68	409	2.36	988
1907.					
April 23	A. H. Horton	66	454	3.02	1,240
1908.					
October 23	O'Neill and Chapman	68	368	1.90	831

Daily gage height, in feet, of Manistee River near Sherman, Mich., for 1907 and 1908.

[Observer, F. J. Bullock.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.42	4.30	6.00	4.65	3.92	3.65	2.40	2.00	1.92	2.50	2.10	2.40
2	2.48	4.00	.....	4.40	3.92	3.40	2.40	2.08	1.98	2.45	2.25	2.35
3	2.60	.....	.....	4.15	3.72	3.35	2.40	2.12	2.08	2.42	2.40	2.28
4	2.58	.....	.....	3.87	3.50	3.32	2.30	2.20	2.10	2.40	2.55	2.25
5	2.52	.....	.....	3.65	3.38	3.40	2.28	2.08	2.10	2.35	2.70	2.15
6	2.50	.....	.....	3.58	3.30	3.40	2.22	2.00	2.10	2.35	2.70	2.10
7	2.50	.....	.....	3.52	3.25	3.38	2.20	2.00	2.05	2.30	2.68	2.12
8	2.50	.....	.....	3.50	3.12	3.25	2.20	2.02	2.05	2.30	2.58	2.30
9	2.45	.....	.....	3.48	3.15	3.08	2.15	2.00	2.10	2.28	2.52	2.50
10	2.45	.....	.....	3.42	3.10	3.00	2.10	1.95	2.12	2.25	2.45	2.70
11	2.40	.....	.....	3.35	3.00	2.88	2.10	2.10	2.18	2.48	2.42	2.70
12	2.40	.....	.....	3.38	3.00	2.82	2.15	2.48	2.20	2.90	2.38	2.55
13	2.40	.....	2.40	3.40	2.92	2.75	2.15	2.28	2.28	3.15	2.32	2.40
14	2.40	.....	2.40	3.40	2.95	2.75	2.15	2.18	2.30	3.05	2.28	2.40
15	2.45	.....	2.42	3.35	3.15	2.70	2.18	2.15	2.20	2.80	2.20	2.40
16	2.50	.....	2.48	3.32	3.30	2.68	2.20	2.25	2.20	2.68	2.20	2.40
17	2.68	.....	2.78	3.28	3.28	2.65	2.15	2.28	2.25	2.58	2.20	2.35
18	2.98	.....	3.30	3.18	3.20	2.62	2.20	2.20	2.30	2.52	2.20	2.35
19	3.32	.....	3.35	3.15	3.20	2.60	2.28	2.18	2.28	2.42	2.18	2.25
20	3.38	.....	3.30	3.10	3.12	2.68	2.30	2.12	2.30	2.38	2.22	2.20
21	3.22	.....	3.35	3.10	3.02	2.78	2.25	2.10	2.35	2.32	2.45	2.20
22	3.20	.....	3.55	3.02	2.95	2.95	2.25	2.10	2.40	2.30	2.62	2.20
23	3.25	.....	3.88	3.00	2.88	3.02	2.25	2.10	2.40	2.30	2.65	2.20
24	3.30	.....	4.22	3.08	2.80	3.08	2.25	2.05	2.45	2.28	2.58	2.20
25	3.65	.....	4.50	3.12	2.92	3.05	2.22	2.00	2.45	2.20	2.50	2.25
26	5.28	.....	4.90	3.20	2.95	2.92	2.30	2.00	2.48	2.10	2.50	2.28
27	5.90	.....	5.12	3.32	3.20	2.78	2.18	2.00	2.50	2.10	2.50	2.55
28	5.90	.....	5.05	3.50	3.65	2.65	2.10	2.00	2.50	2.10	2.45	2.65
29	5.75	.....	5.02	3.70	3.95	2.48	2.10	1.92	2.50	2.10	2.45	2.60
30	5.40	.....	5.10	3.82	3.92	2.40	2.10	1.90	2.50	2.10	2.45	2.50
31	4.88	.....	4.92	.....	3.70	.....	2.10	1.90	.....	2.10	.....	2.40
1908.												
1	2.30	.....	2.40	3.95	4.10	3.10	2.20	2.05	1.85	2.20	1.90	2.40
2	2.25	.....	2.40	4.05	3.90	3.10	2.20	2.00	1.85	2.20	1.85	2.40
3	2.20	.....	2.55	3.82	3.70	2.98	2.20	2.00	1.85	2.20	1.85	2.40
4	2.55	.....	2.40	3.55	3.40	2.90	2.30	1.90	1.85	2.20	1.90	2.40
5	2.55	.....	2.60	3.52	3.35	2.80	2.30	1.80	1.85	2.15	1.90	2.30
6	2.30	.....	2.70	3.60	3.20	2.70	2.35	2.10	1.85	2.10	1.90	2.30
7	2.30	.....	2.70	3.88	3.40	2.60	2.35	2.00	1.85	2.00	1.90	2.30
8	2.30	.....	2.70	4.15	3.70	2.50	2.40	2.00	1.85	2.00	1.90	2.30
9	2.20	.....	2.60	4.35	3.90	2.50	2.40	2.00	1.85	2.00	1.90	2.20
10	2.05	.....	2.45	4.50	3.88	2.50	2.50	1.90	1.85	2.00	1.90	2.10
11	2.20	.....	2.55	4.50	3.72	2.50	2.70	2.12	1.85	1.95	1.90	2.10
12	2.25	2.75	2.78	4.50	3.62	2.45	2.48	2.30	1.85	1.95	1.90	2.15
13	2.20	2.85	2.95	4.48	3.62	2.45	2.35	2.40	1.85	1.95	1.90	2.15
14	2.10	2.90	2.95	4.35	3.65	2.50	2.25	2.60	1.85	1.95	1.90	2.15
15	2.15	3.00	2.95	4.25	3.68	2.60	2.25	2.60	1.85	1.95	1.90	2.15
16	2.15	2.80	2.90	4.18	3.60	2.65	2.30	2.35	1.85	1.95	1.85	2.15
17	2.15	2.50	2.80	4.20	3.50	2.60	2.50	2.25	1.85	1.95	1.90	2.15
18	2.15	2.50	2.80	4.12	3.40	2.50	2.50	2.05	1.85	1.95	2.00	2.15
19	2.10	2.40	2.72	4.10	3.30	2.45	3.00	2.05	1.85	1.95	2.35	2.15
20	2.20	2.50	2.50	4.00	3.20	2.35	3.20	1.90	1.85	1.95	2.20	2.10
21	2.25	2.40	2.40	3.78	3.10	2.30	3.10	1.85	1.85	1.95	2.05	2.10
22	2.25	2.50	2.60	3.72	2.90	2.30	2.80	1.80	1.85	1.95	2.05	2.10
23	2.25	2.30	2.98	3.62	2.90	2.30	2.70	1.85	1.85	1.95	2.20	2.10
24	2.10	2.30	3.42	3.60	2.80	2.40	2.60	1.85	1.85	1.95	2.40	2.10
25	2.05	2.30	3.40	3.55	2.80	2.60	2.40	1.85	1.85	2.05	2.50	2.10
26	2.00	2.30	3.40	3.65	2.70	2.60	2.25	1.85	1.85	2.05	2.50	2.10
27	2.00	2.40	3.52	3.80	2.58	2.40	2.25	1.85	1.85	2.05	2.50	2.10
28	2.00	2.60	3.90	4.05	2.62	2.40	2.15	1.85	2.10	2.00	2.40	2.10
29	2.00	2.40	4.05	4.25	2.90	2.35	2.10	1.85	2.10	2.00	2.40	2.10
30	.....	.....	3.85	4.25	3.05	2.35	2.10	1.85	2.20	1.95	2.40	2.10
31	.....	.....	3.95	.....	3.10	.....	2.05	1.80	.....	1.95	.....	2.10

NOTE.—Ice conditions prevailed January 25 to about March 12, 1907. To what extent the remainder of January, March, and December, 1907, were affected by ice conditions is not known. The effect on the discharge was, however, probably slight.

River frozen January 30 to February 11, 1908 To what extent January, February, March, and December, 1908, may have been affected by backwater from ice conditions is not known. It could not, however, have been excessive.

Rating table for Manistee River near Sherman, Mich., for 1903–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	760	2.70	1,135	3.80	1,591	4.90	2,110
1.70	789	2.80	1,174	3.90	1,635	5.00	2,160
1.80	819	2.90	1,213	4.00	1,680	5.20	2,260
1.90	850	3.00	1,253	4.10	1,726	5.40	2,362
2.00	883	3.10	1,293	4.20	1,772	5.60	2,466
2.10	917	3.20	1,334	4.30	1,818	5.80	2,572
2.20	952	3.30	1,376	4.40	1,866	6.00	2,680
2.30	987	3.40	1,418	4.50	1,914	6.20	2,788
2.40	1,023	3.50	1,461	4.60	1,962	6.40	2,900
2.50	1,060	3.60	1,504	4.70	2,010		
2.60	1,097	3.70	1,547	4.80	2,060		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 14 discharge measurements made during 1903–1908, and is well defined between gage heights 1.6 feet and 4 feet.

Monthly discharge of Manistee River near Sherman, Mich., for 1903–1908.

[Drainage area, 900 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1903.						
July 10–31	1,170	934	1,040	1.16	0.95	A.
August	1,800	970	1,200	1.33	1.53	A.
September	1,330	1,080	1,200	1.33	1.48	A.
October	1,330	1,050	1,150	1.28	1.48	A.
November	1,240	991	1,100	1.22	1.36	A.
December	1,930	966	1,210	1.34	1.54	A.
1904.						
January	1,470	842	1,100	1.22	1.41	A.
February	1,060	934	1,000	1.11	1.20	A.
March	1,580	945	1,100	1.22	1.41	A.
April	2,780	1,730	2,100	2.33	2.60	A.
May	2,080	1,480	1,740	1.93	2.22	A.
June	1,600	1,050	1,240	1.38	1.54	A.
July	1,190	987	1,050	1.17	1.35	A.
August [a]	1,110	876	999	1.11	1.28	A.
September	1,080	866	942	1.05	1.17	A.
October	1,150	952	1,010	1.12	1.29	A.
November	1,020	819	926	1.03	1.15	A.
December	1,000	813	910	1.01	1.16	A.
The year	2,780	813	1,180	1.31	17.78	
1905. [b]						
January	1,020	774	901	1.00	1.15	B.
February	987	.....	855	.950	.99	B.
March	2,870	789	1,300	1.44	1.66	A.
April	2,840	1,210	1,580	1.76	1.96	A.
May	1,440	1,170	1,310	1.46	1.68	A.
June	1,330	952	1,120	1.24	1.38	A.
July	1,360	917	1,110	1.23	1.42	A.
August	1,040	883	952	1.06	1.22	A.
September	1,100	883	954	1.06	1.18	A.
October	1,120	866	963	1.07	1.23	A.
November	1,170	970	1,060	1.18	1.32	A.
December	1,070	952	1,000	1.11	1.28	A.
The year	2,870	.....	1,090	1.21	16.47	

[a] Discharge affected by log jam August 26–27, 1904. Discharge estimated 900 second-feet.
[b] See footnote at end of table, next page.

NOTE.—The winter periods, 1903 and 1904, were assumed unaffected by ice and the open-channel rating applied.

Monthly discharge of Manistee River near Sherman, Mich., for 1903–1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1906.						
January	.....	.....	1,200	1.33	1.53	C.
February	1,550	.....	1,030	1.14	1.19	C.
March	1,440	910	1,110	1.23	1.42	A.
April	2,240	1,380	1,840	2.04	2.28	A.
May	1,670	1,120	1,320	1.47	1.70	A.
June	1,140	987	1,060	1.18	1.32	A.
July	1,250	959	1,050	1.17	1.35	A.
August	1,000	857	920	1.02	1.18	A.
September	952	850	878	.976	1.09	A.
October	945	866	905	1.01	1.16	A.
November	1,580	883	1,060	1.18	1.32	A.
December	1,530	959	1,060	1.18	1.36	A.
The year	2,240	.....	1,120	1.24	16.90	
1907.						
January	1,410	1,020	1,140	1.27	1.46	B.
February	.....	.....	900	1.00	1.04	C.
March	2,220	.....	1,340	1.49	1.72	B.
April	1,990	1,250	1,450	1.61	1.80	A.
May	1,660	1,170	1,370	1.52	1.75	A.
June	1,530	1,020	1,240	1.38	1.54	A.
July	1,020	917	956	1.06	1.22	A.
August	1,050	850	914	1.02	1.18	A.
September	1,060	857	971	1.08	1.20	A.
October	1,310	917	1,030	1.14	1.31	A.
November	1,140	917	1,030	1.14	1.27	A.
December	1,140	917	1,000	1.11	1.28	A.
The year	2,220	.....	1,110	1.24	16.77	
1908.						
January	1,080	.....	943	1.05	1.21	A.
February	1,250	.....	970	1.08	1.16	B.
March	1,700	1,020	1,230	1.37	1.58	A.
April	1,910	1,470	1,690	1.88	2.10	A.
May	1.730	1,090	1,390	1.54	1.78	A.
June	1,290	987	1,080	1.20	1.34	A.
July	1,330	900	1,030	1.14	1.31	A.
August	1,100	819	892	.991	1.14	A.
September	952	834	843	.937	1.05	A.
October	952	866	888	.987	1.14	A.
November	1,060	834	908	1.01	1.13	A.
December	1,020	917	945	1.05	1.21	A.
The year	1,910	.....	1,070	1.19	16.15	

NOTE.—River frozen across January 25 to February 22, 1905, and ice conditions prevailed during the latter part of January and February 1 to 16, 1906. Remainder of 1905 and 1906 assumed unaffected by ice and open-channel rating applied except January 1–19, 1906, when there was no record. Discharge January 25 to 31, 1905, 890 second-feet; February 1 to 22, 1905, 825 second-feet; February 1 to 16, 1906, 800 second-feet.

Discharge estimated January 25 to March 12, 1907. Discharge assumed unaffected by ice January 1 to 24, March 13 to 31, and during December, 1907. Discharge during 1908 assumed unaffected by ice except January 30 to February 11, when the discharge was estimated. Discharge January 25 to 31, 1907, 1,130 second-feet; March 1 to 12, 1907, 900 second-feet; January 30 to 31, 1908, 850 second-feet; February 1 to 11, 1908, 800 second-feet.

MISCELLANEOUS MEASUREMENTS IN LAKE MICHIGAN DRAINAGE.

The following miscellaneous discharge measurements were made in Lake Michigan drainage basin during 1908:

Date.	Stream.	Locality.	Width.	Area of section.	Gage height.	Discharge.
			Feet.	*Sq. ft.*	*Feet.*	*Sec. ft.*
October 16	St. Joseph River	South Bend, Ind	235	1,470	2.60	2,200
October 16	do	do	250	1,010	2.58	2,040
November 3	do	do	244	669	1.45	812
October 20	Kalamazoo River	Allegan, Mich	123	822	.....	864
October 22	Muskegon River	Bridgeton, Mich	252	701	.....	943

LAKE HURON DRAINAGE BASIN.

GENERAL FEATURES.

The area tributary to Lake Huron in the United States comprises the eastern part of the southern peninsula of Michigan. South of Saginaw Bay the Lake Huron slope is very narrow and the brooks and runnels by which it is drained are only a few miles in length. The so-called Thumb of the Mitten is drained chiefly by three short northward-flowing streams known as Willow, Pinnepog, and Pigeon rivers, which lie in a flat, marshy region. The Saginaw River system is tributary to the bay at its head, while northward from the bay are Rifle, Au Sable, and Thunder Bay rivers, streams having considerable fall, excellent ground storage, and well-sustained flow. Cheboygan River also belongs in the Lake Huron drainage.

THUNDER BAY RIVER DRAINAGE BASIN.

DESCRIPTION.

Thunder Bay River rises in the southern part of Montmorency County, in the northeastern part of the lower peninsula of Michigan, and flows in a generally northeasterly direction to within about 15 miles of its mouth, where it turns and flows southwestward, joining Lake Huron in Thunder Bay at Alpena. The important tributaries on the right or south bank, beginning at the sources are: Upper South Branch and South Branch. Nenelon River is a tributary of the South Branch. On the left or north bank there is only one tributary, the North Branch. The total length of the river, not following the bends, is about 50 miles.

The drainage basin is regular in outline and shape. Thunder Bay River proper may be said to be about 8 miles in length, for at this distance above the mouth it receives a large tributary, and 2 miles above this tributary another large stream enters. Both the main river and these two tributaries further subdivide at short distances above, so that the river is relatively small except at the lower end.

The upper portions of the drainage basin are in general level or undulating, the central part is rolling and hilly, and the lower portion is level with shallow sand ridges.

The predominating rocks of this drainage basin are shales, but these have been covered more or less deeply with glacial drift. An outcrop of the shales crosses the drainage basin in a northeast-southwest direction, crossing the river channel a few miles west of Alpena. The surface above the line of this outcrop is almost continuous lime stone composed of nearly pure calcium carbonate, a small area being covered with sand or thin drift deposits. This limestone area contains numerous sink-holes, in many places deep and precipitous. Surface water entering these pits disappears by finding outlets to a

lower level through limestone fissures. Such a pocket, known as Sunken Lake, absorbed the entire flow of the North Branch until 1900, when a puddle dam was built so as to turn the water down its original channel. The drainage basin contains about 30 lakes, averaging 1 square mile in area. In addition to these is Hubbard Lake, whose area is 13.4 square miles. The elevation of the sources of the river is approximately 1,200 feet; the elevation of the mouth is 581 feet.

This drainage basin was formerly heavily timbered with Michigan pine. Most of the pine has been cut, but a large number of conifers, hard woods, white birch, and cedar remains, so that this area may be said to be forested rather than cleared.

The mean annual rainfall is 30 to 35 inches. The winter conditions are severe; the snowfall is heavy. Ice forms from 1 to 2 feet in thickness and lasts for three or four months.

The basin affords excellent opportunities for storage. A dam at the foot of Hubbard Lake produces a storage depth of 5 feet with an aggregate storage capacity of nearly 2,000,000,000 cubic feet of water. Beaver Lake is also used for storage. Undoubtedly the storage capacity of these two lakes could be so increased that a very material addition to the low-water flow could be obtained. There are probably other lakes capable of producing reservoirs of good capacity.

There are a few opportunities for water power in this drainage basin. The most important are in the stretch of the river below the junction of the tributaries, where there are two developments of about 2,000 and 900 horsepower. Other power sites are found elsewhere on the river and tributaries. By developing the storage capacity of the lakes the low-water flow could be considerably increased, thereby increasing the value of the water-power sites.

The stream is still used for running logs, and the storage and releasing of water for flooding modifies the normal flow of the river considerably. Owing to the pervious nature of the rock strata the effective and apparent boundaries of the drainage basin may differ materially.

One gaging station has been maintained in this drainage basin: Thunder Bay River near Alpena, Mich., established April 4, 1901, and maintained to date.

THUNDER BAY RIVER NEAR ALPENA, MICH.

This station, which is located 4 miles above Alpena at the dam and power plant (Pl. VI, *B*) of the Fletcher Paper Company, was established April 4, 1901, to obtain data for studies of water-power problems. It is below all tributaries. The South Branch of Thunder Bay River enters a few miles above the station.

The discharge at this station is obtained by computing the flow through the water wheels, over spillways, log slides, and over the

headrace overflow, the proper coefficients to be applied being assumed from experiments with model dams of nearly or the same shape. Measurements of the flow through the turbines, made in April, 1906, indicated that the manufacturer's rating was 20 per cent in error. All published data previous to 1906 is therefore in error by 20 per cent or less, depending upon how much of the entire flow was taken by the wheels. The discharge at this station is effected by the following factors: The dam has settled, trash and drift lodge on the crest, ice forms on the lower side of the dam, changing the shape of the crest as well as restricting the length of the spillways, and there is some leakage. For these reasons the data obtained are not considered very accurate.

The winter conditions are severe. The stream is used for logging, and the normal flow is modified by storage of water for power and logging purposes.

D. W. Mead has furnished the computations of the discharge at this station for 1906, 1907, and 1908.

The Fletcher Paper Company has furnished the observed records at this station.

Daily discharge, in second-feet, of Thunder Bay River near Alpena, Mich., for 1906, 1907, and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.												
1	731	1,026	1,603	[a]3,167	1,630	1,050	[a]1,087	640	467	929	797	2,719
2	697	947	1,344	3,153	1,426	1,147	1,712	675	[a]369	812	760	[a]2,322
3	690	791	1,135	3,637	1,607	[a]545	2,002	650	97	686	717	1,172
4	680	[a]1,336	[a]1,050	4,094	2,105	700	1,669	709	43	639	[a]697	1,137
5	728	785	962	4,352	2,033	692	1,093	[a]915	172	613	800	1,103
6	717	787	818	4,465	[a]1,766	714	908	648	98	580	691	796
7	[a]524	754	922	4,158	1,363	710	991	610	160	[a]64	696	684
8	583	751	933	[a]3,907	1,196	835	[a]756	554	133	781	696	756
9	563	725	927	3,748	1,217	985	749	446	[a]311	569	740	[a]606
10	629	675	5,849	4,094	1,701	[a]999	678	499	211	670	720	1,007
11	660	[a]574	[a]2,021	4,604	1,496	1,079	661	585	205	610	[a]862	1,088
12	653	665	917	4,787	1,448	699	642	[a]1,044	183	610	801	1,174
13	616	642	859	4,217	[a]914	612	653	523	211	569	723	1,168
14	[a]528	634	806	4,036	1,427	676	688	466	191	[a]64	694	1,112
15	667	612	930	[a]3,784	1,470	621	[a]608	430	183	797	661	1,039
16	744	612	770	4,715	1,351	616	745	531	[a]110	589	612	[a]814
17	708	576	2,876	3,748	1,247	[a]68	700	293	191	589	604	996
18	810	[a]632	[a]1,621	3,637	2,102	710	678	280	200	557	[a]697	978
19	796	582	1,295	2,533	2,702	697	652	[a]229	191	577	830	887
20	758	662	806	3,808	[a]2,679	648	650	230	183	611	784	792
21	[a]461	752	772	2,500	2,170	688	613	180	175	[a]64	822	792
22	1,213	1,017	747	[a]2,591	1,761	669	[a]608	44	245	1,043	1,141	753
23	1,455	933	716	2,556	1,277	781	753	126	[a]112	517	1,443	[a]524
24	2,021	1,000	763	2,047	1,232	[a]101	678	126	401	676	1,712	399
25	2,134	[a]1,335	[a]966	1,896	1,188	752	626	239	432	668	[a]1,717	789
26	1,885	1,734	788	2,274	1,215	755	601	[a]98	432	732	1,852	954
27	1,682	2,030	903	1,826	[a]834	651	575	379	432	741	2,063	746
28	[a]1,550	2,181	1,235	1,682	1,602	690	586	159	687	[a]64	2,706	792
29	1,355	.....	1,343	[a]1,293	1,667	693	[a]408	307	508	1,375	2,884	758
30	1,253	.....	1,823	1,611	1,154	1,111	755	204	[a]68	918	2,831	[a]578
31	1,154	.....	2,531	.....	1,113	.....	633	235	.....	839	.....	1,007

[a] Sunday.

Daily discharge, in second-feet, of Thunder Bay River near Alpena, Mich., for 1906, 1907, and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1,181	905	655	3,376	1,937	2,740	569	364	[a] 304	416	738	[a] 468
2	1,420	846	666	2,851	2,506	[a] 2,408	635	441	350	463	521	584
3	1,614	[a] 1,482	[a] 459	2,062	2,512	2,131	633	588	508	381	[a] 574	484
4	1,651	882	737	2,344	2,274	1,506	246	[a] 304	450	390	1,131	528
5	1,620	833	737	2,166	[a] 1,759	1,599	636	570	536	501	787	575
6	[a] 1,694	817	719	1,832	2,069	2,068	570	502	529	[a] 246	660	610
7	1,614	772	709	[a] 1,830	2,001	1,993	[a] 165	514	523	519	688	661
8	1,472	760	703	1,081	1,501	1,949	642	446	[a] 409	458	601	[a] 576
9	1,268	720	682	1,230	1,507	[a] 1,504	599	439	493	485	918	883
10	1,297	[a] 1,094	[a] 821	1,760	1,391	1,332	642	465	413	716	[a] 98	787
11	1,170	761	708	1,474	1,423	1,253	604	[a] 350	434	389	731	732
12	1,035	721	740	1,717	[a] 1,109	1,204	578	489	452	318	412	615
13	[a] 998	745	860	1,991	1,240	1,159	619	313	434	[a] 612	412	367
14	1,128	650	813	[a] 1,633	1,240	1,098	[a] 246	444	467	481	227	613
15	1,086	1,830	842	1,417	1,230	1,084	673	435	[a] 547	358	415	[a] 453
16	1,015	721	810	1,398	1,234	[a] 479	620	445	531	406	531	712
17	914	[a] 940	[a] 1,890	1,486	1,180	606	612	503	473	413	[a] 408	728
18	982	749	1,564	1,232	1,248	593	594	[a] 474	462	425	524	763
19	1,008	757	1,685	1,242	[a] 1,109	634	604	522	535	473	604	780
20	[a] 1,437	757	1,685	1,184	1,603	642	599	465	546	[a] 209	597	763
21	1,656	757	1,685	[a] 689	1,272	609	[a] 428	458	472	577	597	736
22	1,735	705	1,764	1,270	1,597	599	604	476	[a] 547	485	748	[a] 488
23	1,828	656	1,818	1,198	1,632	[a] 476	610	440	255	474	927	708
24	1,759	[a] 757	[a] 2,894	1,129	979	719	554	[a] 479	530	450	[a] 542	541
25	1,661	684	3,362	1,186	1,131	689	452	[a] 408	445	424	752	961
26	1,431	686	4,212	1,180	[a] 1,188	689	452	508	475	445	752	755
27	[a] 1,209	674	4,614	1,337	1,864	689	450	424	556	[a] 141	777	673
28	1,085	654	4,789	[a] 1,627	2,209	637	[a] 246	429	475	528	782	709
29	1,075	.....	4,989	2,403	2,800	708	578	433	[a] 304	492	752	[a] 961
30	1,003	.....	4,277	1,562	2,863	[a] 305	461	412	537	555	803	753
31	914	.....	[a] 4,141	.....	2,753	.....	315	451	.....	569	.....	767
1908.												
1	732	489	[a] 2,731	2,248	2,930	1,071	560	315	145	469	[a] 465	837
2	660	[a] 1,350	1,226	2,342	2,678	2,286	560	[a] 68	154	525	626	739
3	626	1,580	638	2,342	[a] 2,656	1,448	980	236	137	476	577	587
4	487	510	628	2,913	2,282	1,087	547	175	145	[a] 253	570	558
5	[a] 573	510	628	[a] 2,913	1,122	858	[a] 476	261	120	635	576	627
6	515	510	628	2,964	2,007	1,010	849	229	[a] 24	514	547	[a] 733
7	518	515	581	2,248	2,240	[a] 541	1.396	147	145	464	531	709
8	513	491	[a] 2,314	2,725	2,530	817	864	125	145	464	[a] 115	762
9	512	[a] 1,116	977	3,254	3,016	703	1,133	[a] 68	137	486	620	694
10	483	631	537	3,725	[a] 3,212	670	1,484	92	137	495	532	691
11	477	510	530	3,917	3,913	674	2,089	174	131	[a] 253	516	738
12	[a] 660	510	561	[a] 4,335	3,242	625	[a] 1,703	204	272	670	549	728
13	525	539	639	3,986	3,032	642	1,396	318	[a] 198	464	510	[a] 1,041
14	510	615	664	4,468	2,808	[a] 166	769	202	155	484	520	808
15	513	707	[a] 2,431	4,433	2,596	692	781	336	168	423	[a] 446	737
16	513	[a] 1,672	1,213	4,648	2,550	601	618	[a] 413	145	295	644	737
17	513	887	737	4,468	[a] 2,069	608	614	319	155	257	516	711
18	487	647	737	3,917	2,204	569	385	264	98	[a] 849	555	640
19	[a] 995	625	716	[a] 3,887	1,600	567	[a] 351	228	122	490	553	616
20	634	414	728	3,430	2,834	610	627	237	[a] 122	483	536	[a] 416
21	517	414	732	3,255	1,283	[a] 68	523	198	115	483	575	693
22	530	419	[a] 2,314	2,965	1,004	696	416	249	115	483	[a] 2,443	1,061
23	518	[a] 854	1,687	2,965	1,367	669	600	[a] 316	115	484	683	628
24	506	954	1,174	2,919	[a] 1,236	1,961	486	245	166	493	625	318
25	492	497	1,418	2,784	1,600	1,588	371	245	204	[a] 474	720	747
26	[a] 843	494	1,728	[a] 2,656	1,066	1,858	[a] 141	218	474	814	798	731
27	602	506	1,905	2,724	988	1,858	494	233	[a] 542	795	846	[a] 748
28	506	661	2,222	2,730	1,139	[a] 1,817	427	229	298	642	851	743
29	509	646	[a] 2,775	2,937	1,109	1,225	330	232	383	591	[a] 882	676
30	509	.....	2,818	3,151	1,044	840	288	[a] 68	388	591	914	676
31	509	.....	2,005	.....	[a] 296	.....	266	246	.....	611	.....	650

[a] Sunday.

Monthly discharge of Thunder Bay River near Alpena, Mich., for 1906, 1907, and 1908.

[Drainage area 1,260 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1906.					
January	2,134	[a] 461	956	0.76	0.871
February	2,181	[a] 574	919	.73	.757
March	5,849	716	1,323	1.05	1.195
April	4,787	[a] 1,293	3,297	2.61	2.905
May	2,702	[a] 834	1,551	1.23	1.418
June	1,147	[a] 68	723	.574	.640
July	2,002	[a] 408	812	.644	.740
August	1,044	[b] 44	409	.325	.372
September	687	[b] 43	247	.196	.218
October	1,375	[a] 64	631	.501	.575
November	2,884	604	1,125	.892	.995
December	2,719	399	982	.779	.898
The year	5,849	[b] 43	1,081	.858	11.584
1907.					
January	1,828	914	1,321	1.048	1.206
February	1,830	654	833	.661	.686
March	4,989	[a] 459	1,840	1.460	1.680
April	3,376	[a] 689	1,629	1.292	1.440
May	2,863	979	1,686	1.338	1.535
June	2,740	[a] 305	1,136	.900	1.003
July	673	[a] 165	523	.415	.477
August	588	[a] 304	451	.358	.411
September	556	255	466	.370	.413
October	716	[a] 141	442	.351	.403
November	1,131	[a] 98	633	.502	.559
December	961	367	669	.530	.610
The year	4,989	98	969	.769	10.423
1908.					
January	995	477	564	.447	.514
February	1,672	414	699	.554	.597
March	2,818	530	1,310	1.040	1.193
April	4,648	2,248	3,275	2.600	2.890
May	3,913	[a] 296	2,053	1.626	1.870
June	2,286	[a] 68	961	.764	.850
July	2,089	[a] 141	727	.577	.664
August	413	[a] 68	222	.176	.202
September	542	[a] 24	183	.145	.162
October	849	[a] 253	513	.407	.467
November	2,443	[a] 115	661	.525	.586
December	1,061	318	703	.558	.643
The year	4,648	24	989	.785	10.638

[a] Sunday. [b] Not reliable; error in reading gage.

AU SABLE RIVER DRAINAGE BASIN.

DESCRIPTION.

The drainage basin of Au Sable River lies in the northeastern part of Michigan. The river rises in the heart of the plateau region in the central part of northern Michigan, in the southern part of Otsego County, flows southward along the western side of Crawford County to Grayling, then turns and flows eastward across Crawford and Oscoda counties, thence southeastward, and joins Lake Huron at Au Sable. The South Branch and the North Branch are the principal tributaries. The river is about 100 miles in length, not following the bends, and its total drainage area comprises about 2,010 square miles.

Along the lower 20 miles of the river the drainage basin is narrow, having an average width of about 5 miles; but farther up it is somewhat regular in shape, being about 40 miles long by about 30 miles wide. The drainage basin is underlain by shales which have been so deeply covered with glacial drift that rock outcrops are very rare. The upper end of the narrow part of the basin is rolling and hilly; the lower part is level and undulating. In its wider portion the basin consists chiefly of sand and gravel plains with undrained hollows. The elevation of the sources of the river is about 1,250 feet; at Bamfield, about 40 miles from the mouth, following the river, the elevation is about 850 feet; the elevation of the mouth is 581 feet.

This district was at one time noted for its white pine, but the area is now almost entirely cleared of its valuable native timber and is in great part covered with scrub conifers. The mean annual rainfall is about 30 to 35 inches. It is possible that deforestation has increased the flow of this stream by allowing the rainfall to be entirely absorbed by the sand and gravel soil. The water thus absorbed reappears as springs. The springs, which occur wherever the streams have cut down through the sand and gravel to the underlying clay, help maintain the flow of the stream in dry periods, and have a tendency to keep the river open during the winter months, although the winter conditions are severe, snowfall being comparatively heavy, and ice of considerable thickness forming on the streams.

The arrangement of this basin is very favorable for water-power developments, as three-fourths of the drainage area lies above the narrow portion in which the opportunities are found. Along this section the bed of the stream is of firm clay and in many places the river is flanked by high terraced clay cliffs rising 60 to 100 feet above it. Extensive investigations are now being made preparatory to developing the power.

The river is still used for logging, but the run of logs is small.

One gaging station has been maintained in this drainage basin: Au Sable River at Bamfield, Mich., established August 27, 1902, and maintained to date.

AU SABLE RIVER AT BAMFIELD, MICH.

This station, which is located at the steel highway bridge at Bamfield, Mich., was established August 27, 1902, to obtain data for use in water-power studies.

The measuring section was formerly located at a wooden bridge about 400 feet above the new steel bridge from which measurements are now made. The steel bridge was begun in March, 1907, and finished in July, 1907. The gage, which is fastened to a pier of the old bridge, is unchanged, and the section at the gage has not been altered in any way. It is probable that the river is used for log driving only in the spring of the year, for during the summer and fall the gage heights are fairly uniform. As sunken logs are removed from the river twice each year, they have little if any effect on the gage readings. Winters are severe in this locality; the river generally freezes over, but does not remain closed longer than one or two months. Any increase in gage height during the winter months, unless caused by a thaw, is generally caused by backwater from ice jams formed by anchor ice.

Except as stated above the records are reliable and accurate. The datum of the gage has remained unchanged.

Discharge measurements of Au Sable River at Bamfield, Mich., in 1907 and 1908.

Date	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 19[a]	A. H. Horton	98	586	2.13	1,540
April 20	do		577	2.01	1,630
1908.					
October 26	O'Neill and Chapman	81.5	401	1.25	1,170

[a] Discharge probably affected by log jam.

Daily gage height, in feet, of Au Sable River at Bamfield, Mich., for 1907 and 1908.

[Observer, Mrs. W. H. Bamfield.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.8	.....	.....	4.8	2.45	2.95	2.5	1.3	0.9	1.4	1.1	1.25
2	2.8	.....	.....	4.9	2.55	2.55	2.4	1.3	.9	1.4	1.1	1.2
3	2.7	.....	.....	4.85	2.7	3.2	2.2	1.1	.9	1.4	1.0	1.2
4	2.65	.....	.....	4.75	2.8	3.4	2.25	1.1	.9	1.3	1.1	1.15
5	2.7	.....	.....	4.7	2.8	3.45	2.2	1.1	.9	1.3	1.15	1.15
6	2.7	.....	.....	4.6	2.5	3.4	2.1	1.1	1.0	1.4	1.05	1.15
7	2.7	.....	.....	4.45	2.9	3.15	2.2	1.1	1.0	1.5	1.1	1.1
8	2.6	.....	.....	4.2	2.5	3.75	1.3	1.1	1.0	1.5	1.15	1.1
9	2.6	.....	.....	4.05	3.45	3.75	1.25	1.0	1.05	1.6	1.1	1.1
10	2.6	.....	.....	4.1	3.45	3.8	1.25	1.0	1.1	1.7	1.2	1.1
11	2.7	.....	.....	4.0	3.45	3.7	1.1	1.0	1.2	1.8	1.1	1.1
12	2.65	.....	.....	3.7	3.35	3.6	1.2	1.0	1.2	1.65	1.1	1.1
13	2.6	.....	.....	3.55	3.15	3.6	1.3	1.0	1.3	1.5	1.1	1.0
14	2.55	.....	.....	3.2	3.3	3.5	1.3	1.0	1.3	1.45	1.1	1.0
15	2.5	.....	.....	3.0	3.3	3.4	1.3	1.0	1.25	1.4	1.1	1.1
16	2.6	.....	.....	2.8	3.35	3.35	1.3	1.1	1.2	1.35	1.2	1.15
17	2.7	.....	.....	2.35	3.15	3.35	1.3	1.1	1.2	1.3	1.2	1.25
18	2.75	.....	.....	2.3	3.15	3.25	1.3	1.1	1.25	1.3	1.2	1.4
19	2.9	.....	.....	2.05	3.0	3.15	1.4	1.1	1.2	1.25	1.4	1.3
20	.....	.....	4.50	2.1	3.05	3.2	1.4	1.0	1.3	1.2	1.45	1.3
21	.....	.....	4.6	2.0	2.85	3.15	1.4	1.0	1.3	1.2	1.5	1.2
22	.....	.....	5.0	1.9	2.75	2.95	1.3	1.0	1.4	1.15	1.55	1.15
23	.....	.....	5.0	2.05	2.65	2.75	1.3	1.1	1.4	1.15	1.5	1.1
24	.....	.....	5.1	2.25	2.7	2.65	1.3	1.1	1.5	1.1	1.4	1.1
25	.....	.....	5.0	2.35	2.25	2.5	1.35	1.3	1.5	1.1	1.4	1.05
26	.....	.....	4.9	2.15	2.65	2.15	1.35	1.3	1.4	1.1	1.2	1.2
27	.....	.....	5.0	2.15	2.6	2.1	1.4	1.3	1.5	1.15	1.2	1.2
28	.....	.....	5.0	2.35	2.85	2.55	1.4	1.0	1.5	1.15	1.2	1.15
29	.....	.....	5.2	2.45	3.0	2.8	1.35	1.0	1.6	1.2	1.3	1.1
30	.....	.....	5.1	2.4	3.0	2.9	1.3	1.0	1.6	1.2	1.3	1.1
31	.....	.....	5.05	.....	2.95	.....	1.3	.95	.....	1.15	.....	1.1
1908.												
1	1.0	.....	.....	2.55	3.0	2.45	1.45	1.1	0.95	1.2	0.91	1.85
2	1.0	.....	.....	2.6	2.9	2.45	1.45	1.1	.9	1.05	.9	1.87
3	1.0	.....	.....	2.85	2.8	2.35	1.35	1.1	.9	1.2	.9	1.9
4	1.0	.....	.....	3.0	2.6	2.35	1.45	1.0	.9	1.1	.95	2.0
5	1.1	.....	.....	2.75	2.4	2.4	1.45	1.0	1.0	1.0	.95	1.95
6	1.1	.....	.....	2.75	2.25	2.5	1.35	1.0	1.0	1.0	1.0	1.7
7	1.1	.....	.....	3.15	2.25	2.6	1.35	1.0	1.0	1.05	1.0	1.5
8	1.1	.....	.....	3.3	2.75	2.65	1.35	1.1	.95	1.05	1.0	1.4
9	1.1	.....	.....	3.35	3.05	2.55	1.45	1.2	.9	1.0	1.0	1.4
10	1.15	.....	.....	3.55	3.0	2.55	1.45	1.2	.9	1.0	1.0	1.4
11	1.25	.....	.....	3.95	2.75	2.35	1.35	1.2	.9	1.0	1.0	1.2
12	1.45	.....	.....	3.75	2.75	2.25	1.45	1.1	.9	1.1	.95	1.1
13	1.5	.....	.....	3.55	2.75	2.1	1.45	1.2	.9	1.1	.95	1.1
14	1.3	.....	.....	3.5	2.85	2.05	1.45	1.4	.9	1.1	.95	1.1
15	1.25	.....	.....	3.5	2.6	2.1	1.45	1.6	.9	1.05	.95	1.0
16	1.2	.....	1.1	3.5	2.5	2.15	1.35	1.15	.9	1.0	1.05	1.1
17	1.2	.....	1.1	3.45	2.5	2.0	1.35	1.4	1.0	1.0	1.2	1.2
18	1.3	.....	1.2	3.3	2.5	1.9	1.65	1.3	1.0	1.0	1.1	1.2
19	1.4	.....	1.1	3.15	2.4	1.85	1.55	1.2	.9	.9	1.05	1.05
20	1.25	.....	1.1	2.95	2.4	1.75	1.7	1.1	.9	.9	1.05	1.05
21	1.2	.....	1.1	2.8	2.4	1.55	1.6	1.0	.9	.9	1.05	1.2
22	1.1	.....	1.2	2.7	2.3	1.75	1.5	1.0	.8	.9	1.0	1.1
23	1.1	.....	1.2	2.65	2.2	1.7	1.45	1.0	.8	1.0	1.1	1.15
24	1.1	.....	1.4	2.5	2.1	1.6	1.45	1.0	.8	1.1	1.2	1.15
25	1.15	.....	1.4	2.6	2.1	1.5	1.4	1.0	.9	1.35	1.3	1.2
26	1.25	.....	1.5	2.85	2.05	1.5	1.3	1.0	.9	1.2	1.5	1.2
27	1.15	.....	1.5	3.1	2.0	1.5	1.2	1.0	.9	1.1	1.65	1.1
28	.....	.....	1.65	3.4	1.9	1.4	1.2	1.0	.9	1.0	1.6	1.5
29	.....	.....	1.85	3.45	1.9	1.5	1.15	.9	1.0	.9	1.4	1.3
30	.....	.....	2.1	3.25	2.0	1.45	1.15	.9	1.3	.95	1.55	1.0
31	.....	.....	2.4	.....	2.45	.....	1.2	.9	.....	.95	.....	1.0

NOTE.—Ice conditions prevailed from about January 20 to March 20, 1907, and from about January 28 to March 15, 1908.

Rating table for Au Sable River at Bamfield, Mich., for 1902–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	1,050	1.90	1,570	2.90	2,260	3.90	3,050
1.00	1,100	2.00	1,630	3.00	2,340	4.00	3,130
1.10	1,140	2.10	1,700	3.10	2,410	4.20	3,300
1.20	1,200	2.20	1,760	3.20	2,490	4.40	3,480
1.30	1,240	2.30	1,830	3.30	2,570	4.60	3,650
1.40	1,300	2.40	1,900	3.40	2,650	4.80	3,840
1.50	1,340	2.50	1,960	3.50	2,730	5.00	4,020
1.60	1,400	2.60	2,040	3.60	2,810	5.20	4,220
1.70	1,460	2.70	2,110	3.70	2,890		
1.80	1,520	2.80	2,190	3.80	2,970		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made in 1902–1908, and is well defined below gage height 3.5 feet.

Monthly discharge of Au Sable River at Bamfield, Mich., for 1907 and 1908.

[Drainage area, 1,420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January 1–19	2,260	1,960	2,090	1.47	1.04	B.
March 20–31	4,220	3,560	3,980	2.80	1.25	B.
April	3,930	1,570	2,550	1.80	2.01	A.
May	2,690	1,800	2,280	1.61	1.86	A.
June	2,970	1,700	2,450	1.73	1.93	A.
July	1,960	1,140	1,370	.965	1.11	A.
August	1,240	1,070	1,140	.803	.93	A.
September	1,400	1,050	1,210	.852	.95	A.
October	1,520	1,140	1,260	.887	1.02	A.
November	1,370	1,100	1,200	.845	.94	A.
December	1,300	1,100	1,170	.824	.95	A.
1908.						
January 1–27	1,340	1,100	1,180	.831	.83	B.
March 16–31	1,900	1,140	1,320	.930	.55	A.
April	3,090	1,960	2,440	1.72	1.92	A.
May	2,370	1,570	1,950	1.37	1.58	A.
June	2,080	1,300	1,660	1.17	1.30	A.
July	1,460	1,170	1,300	.915	1.05	A.
August	1,400	1,050	1,150	.810	.93	A.
September	1,240	1,000	1,060	746	.83	A.
October	1,270	1,050	1,120	.789	.91	A.
November	1,430	1,050	1,150	.810	.90	A.
December	1,630	1,100	1,200	.887	1.02	A.

RIFLE RIVER DRAINAGE BASIN.

DESCRIPTION.

The drainage of Rifle River lies in the northeastern part of Michigan, its headwaters draining the southeastern slopes of the plateau region. The river rises in the northern part of Ogemaw County, flows southward to the vicinity of Sterling, in Arenac County, and thence southeastward, joining Lake Huron in Saginaw Bay. Its length, not following the bends in the river, is about 45 miles. It has but one important tributary—the West Branch.

The drainage basin is comparatively long and narrow, being less than 20 miles across at its widest point, and is heavily overlain with glacial deposits—sand, overwash gravel, and till. A considerable portion of the area is composed of so-called "jack pine" lands, which are covered with a light growth of scrub pine. The basin contains numerous small glacial lakes, but there is no controlled storage. The lower portion of the basin is flat, with shallow sand ridges; the upper

part is composed of sand and gravel plains with undrained hollows; the central portion is rolling and hilly, with a section along the river similar to that of the upper part. The sources of the river are about 1,000 feet above sea level; at the mouth the elevation is 581 feet.

Much of the timber has been cut off from this basin and extensive fires have occurred. A considerable area is being cultivated, but some section of the stream are still wild and undeveloped and are still covered with trees.

The mean annual rainfall is about 30 to 35 inches. The winters are severe, the snowfall is heavy and ice forms from 1 to 2 feet in thickness.

Storage possibilities have not been investigated, but it is thought that some of the lakes near the sources of the river might be utilized.

The stream offers good opportunities for water-power developments. In some sections the river flows for miles between high clay bluffs, and at one place in Ogemaw County sandstone ledges appear in the river bottom for over a mile. The Flint Land Company, of Flint, Mich., control most of the power sites along the river.

The river is still used to some extent for logging. As much of the soil of the area is composed of sand and gravel, the rainfall is quickly absorbed, and where the river has cut its bed down to rock numerous springs occur. These springs keep the river from freezing during the winter months, and also help maintain the flow during dry periods.

The following gaging stations have been maintained in this river basin:

Rifle River at Sterling, Mich., 1905–1908.
Rifle River at Omer, Mich., 1902–3.

RIFLE RIVER NEAR STERLING, MICH.

This station is located in sec. 5, T. 19 N., R. 5 E., at the highway bridge known as Meeker's bridge, near Sterling, Mich. It was established November 14, 1905, to obtain data for use in studying water-power problems, and was discontinued December 31, 1908.

The winter conditions are somewhat severe, the fall of snow is considerable, and ice at times modifies the relations between discharge and gage heights.

The datum of the gage has remained unchanged and the records have been accurately kept. The stream bed at the measuring section is composed of sand and shifts considerably, especially during floods. Sufficient discharge measurements have not been made to determine the discharge curve or to establish definitely the changes in the section. The gage heights should therefore be used with caution, if at all.

The salary of the gage reader at this station has been paid by the Flint Land Company, of Flint, Mich.

The following discharge measurement was made April 22, 1907: Width, 48 feet; area, 165 square feet; gage height, 1.21 feet; discharge, 412 second-feet.

Daily gage height, in feet, of Rifle River near Sterling, Mich., for 1907 and 1908.

[Observer, Myron Meeker.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.52	3.05	2.62	2.98	3.80	1.40	0.81	0.02	0.08	0.46	0.12	0.39
2	4.50	3.08	3.30	2.65	3.72	1.20	.77	.15	—.01	.30	.32	.30
3	4.12	3.00	3.20	2.45	3.15	1.08	.70	.15	—.02	.22	.65	.25
4	4.05	3.21	3.05	2.30	2.70	1.15	.69	.08	.05	.20	.45	.28
5	3.77	3.36	3.12	2.22	2.35	1.56	.60	.10	.18	.12	.50	.95
6	3.66	3.02	3.02	2.12	2.22	1.45	.50	.15	.10	.15	.75	1.65
7	3.50	3.15	2.92	2.00	2.00	1.28	.37	.08	.10	.14	.55	1.45
8	3.68	3.18	2.88	2.25	1.82	1.10	.34	—.02	.08	.18	.45	1.40
9	3.45	3.16	2.88	2.70	1.62	.90	.24	—.01	.02	.18	.40	1.35
10	2.91	3.08	2.88	2.58	1.50	.74	.18	—.05	.00	.18	.35	1.80
11	2.92	2.99	2.88	2.35	1.42	.76	.25	—.09	.12	.12	.20	2.45
12	3.00	2.92	3.25	2.25	1.28	1.00	.29	—.09	.41	.12	.15	2.00
13	2.76	3.04	3.55	2.26	1.24	.96	.21	—.10	.35	.08	.12	2.30
14	2.90	3.10	3.82	2.15	1.19	.77	.15	—.12	.10	.08	.15	2.60
15	2.70	2.98	3.50	1.85	1.28	.66	.19	—.10	.05	.12	.22	2.20
16	2.45	3.00	4.40	1.75	1.35	.64	.30	—.02	.00	.10	.15	2.48
17	2.60	2.95	6.68	1.69	1.32	.43	.20	.18	.12	.10	.15	2.25
18	2.68	2.85	6.30	1.60	1.25	.42	.15	.10	.08	.08	.08	1.80
19	2.98	2.90	5.80	1.45	1.19	.60	.10	.00	.20	.06	.08	1.82
20	7.25	2.90	6.00	1.35	1.00	.55	.45	.18	.40	.02	.20	1.82
21	7.00	2.78	5.91	1.32	.92	.50	.32	.12	.26	.00	.84	1.75
22	4.85	2.66	5.68	1.25	.82	1.00	.22	.00	.10	.02	1.25	1.72
23	4.15	2.65	6.45	1.32	.88	2.50	.15	.00	.10	.02	.95	1.52
24	3.62	2.72	6.35	1.28	.82	2.50	.18	—.06	.15	.04	.65	1.35
25	3.60	2.64	5.30	1.72	.82	2.10	.15	—.10	.20	.02	.45	1.38
26	3.46	2.66	5.15	2.00	1.25	2.50	.32	—.08	.12	.02	.50	1.42
27	3.45	2.70	5.08	1.88	2.25	2.01	.22	—.05	.10	.15	.52	1.50
28	3.40	2.60	4.50	1.75	2.50	1.50	.05	.00	.10	.15	.50	1.38
29	3.25	.....	4.62	2.55	2.20	1.12	.09	—.02	.65	.15	.38	1.22
30	3.16	.....	4.72	3.85	1.88	.95	.00	—.05	1.05	.10	.48	1.50
31	3.20	.....	3.90	.....	1.41	.....	.05	—.08	.....	.08	.....	1.25
1908.												
1	1.25	1.24	1.94	3.60	1.55	.34	.....	.....	.....	.....	.....	.10
2	1.22	1.34	1.88	3.15	1.25	.20	.....	.....	.....	.....	.....	.00
3	1.12	1.32	1.91	2.55	1.20	.10	.....	.....	.....	.....	.....	.25
4	1.02	1.42	1.88	2.70	1.00	.02	.....	.....	.....	.....	.....	.05
5	1.00	1.52	1.88	2.30	.80	.00	.....	.....	.....	.....	.....	.42
6	.96	1.58	2.12	2.35	.65	.00	.....	.....	.....	.....	.....	.95
7	.95	1.65	2.43	2.68	1.02	.05	.....	.....	.....	.....	.....	1.95
8	.92	1.66	2.64	3.12	2.08	.14	.....	.....	.....	.....	.....	2.45
9	.85	1.61	2.40	3.22	2.35	.00	.....	.....	.....	.....	.....	2.20
10	.84	1.62	2.35	3.05	1.95	.....	.....	.....	.....	.....	.....	1.90
11	1.12	1.66	2.25	2.98	1.50	.....	.....	.....	.....	.....	.....	1.88
12	1.25	1.82	2.50	2.50	2.50	.....	.....	.....	.....	.....	.....	1.75
13	1.00	1.98	2.96	2.18	2.40	.....	.....	.....	.....	.....	.....	1.60
14	1.11	2.19	3.27	2.08	3.20	.....	.....	.....	.....	.....	.....	1.68
15	1.26	2.19	3.40	1.90	2.95	.....	.....	.....	.....	.....	.....	1.85
16	1.24	2.16	3.07	1.72	2.43	.....	.....	.....	.....	.....	.....	1.30
17	1.12	2.06	2.92	1.33	1.90	.....	.....	.....	.....	.....	.....	1.38
18	1.17	2.02	2.84	1.29	1.55	.....	.10	.....	.....	.....	.....	1.30
19	1.29	1.95	2.60	1.19	1.41	.....	.12	.....	.....	.....	.....	1.22
20	1.29	1.85	2.34	1.08	1.12	.....	.02	.....	.....	.....	.....	1.10
21	1.28	1.91	2.40	1.02	.90	.....	.....	.....	.....	.....	.....	1.05
22	1.32	1.85	2.60	.97	.75	.....	.....	.....	.....	.....	.....	.80
23	1.26	1.88	3.80	.78	.62	.....	.....	.....	.....	.....	.....	.45
24	1.12	1.80	5.35	.82	.48	.....	.....	.....	.....	.....	.....	1.05
25	1.08	1.83	4.89	.75	.25	.....	.....	.....	.....	.....	.....	.85
26	1.35	1.92	4.40	.85	.30	.....	.....	.....	.....	.....	.05	.82
27	1.05	1.85	4.81	1.05	.45	.....	.....	.....	.....	.....	.05	.78
28	1.30	1.90	4.62	2.31	.15	.....	.....	.....	.....	.....	.....	.30
29	1.32	1.85	4.28	2.25	.20	.....	.....	.....	.....	.....	.....	.70
30	1.18	.....	3.50	1.95	.13	.....	.....	.....	.....	.....	.25	.85
31	1.16	.....	3.75	.....	.35	.....	.....	.....	.....	.....	.....	.45

NOTE.—Ice conditions probably prevailed from about January 1 to March 24 and December 5–31, 1907, and from about January 1 to March 28, and December 6 to 31, 1908. Water below gage and no readings taken for all missing days.

SAGINAW RIVER DRAINAGE BASIN.

DESCRIPTION.

The drainage basin of Saginaw River lies in the north-central part of Michigan, surrounding Saginaw Bay. The Saginaw is formed by three rivers: Tittabawassee River, which is the most northern; Shiawassee River, which extends to the south; and Cass River, which drains the eastern part of the basin. Tittabawassee River rises in the southwestern part of Ogemaw County, flows southward to the central part of Midland County near Midland, then southeastward, and joins Saginaw River a few miles above the city of Saginaw; it receives the waters of Tobacco, Salt, and Pine rivers, and Chippewa River, which discharges to the Pine. Shiawassee River rises in the central part of Livingston County and flows northward into Saginaw River. This river is really the main stream of the drainage basin, as it is a direct continuation of Saginaw River. Its principal tributaries are Bad and Flint rivers. Cass River, the smallest of the three tributaries that form the Saginaw, is formed by the union of the North and South branches. Considering the South Branch as the main stream, the river rises in the western part of Sanilac County, flows northward until it crosses into Tuscola County, then southwestward into the Saginaw about opposite the mouth of the Tittabawassee. It has no important tributaries of any size.

Saginaw River proper is only 20 miles long; the Tittabawassee and the Shiawassee are about 80 miles in length; and the Cass is about 75 miles long. None of these measurements takes into account the short bends and angles. The total drainage area of Saginaw River comprises about 6,260 square miles; of this area about 2,620 square miles belong to the Tittabawassee; about 2,420 square miles to the Shiawassee; and about 994 square miles to the Cass.

This drainage basin, like most of the river basins in Michigan, is covered with glacial drift, and presents a flat surface varied only by the valleys which the larger streams have cut from 10 to 30 feet below the plain. The depth of the surface deposits is not anywhere uniform, varying from a thin film to a layer 500 feet thick, but being in most places about 80 to 100 feet in thickness. To the southeast the drift coating is very thin, the maximum being about 40 feet, but toward the west it becomes thicker.

The sources of the Tittabawassee lie about 900 feet above sea level; at Midland the elevation is about 600 feet; Saginaw Bay is about 581 feet above sea level. The elevation of the sources of the Shiawassee is about 920 feet; at Coruna the elevation is about 740 feet. The sources of the Cass are at an elevation of about 800 feet; at Vassar the elevation is about 610 feet. The slope of the Saginaw River is so small that fluctuations in the elevation of Saginaw Bay caused by strong winds sometimes reverse the current in the river.

This section of Michigan has been about cleared of its timber, and the entire area is largely under cultivation, but some lumbering is still being done on the Tittabawassee.

The mean annual rainfall is from 25 to 30 inches. The winter conditions are comparatively severe in the northern half of the basin; the snowfall is heavy, and ice of considerable thickness forms on the streams; in the southern half of the basin the winters are somewhat milder. The climate and temperature of the entire lower peninsula of Michigan is much modified by the bodies of water that surround it.

Storage possibilities have not yet been investigated. The land in the drainage basins of the Shiawassee and Cass and in the lower part of the Tittabawassee is becoming of such value for agricultural purposes and swamp areas are being reclaimed to such an extent that there is little opportunity for storage on these two streams. The map, however, shows several lakes at the sources of the Shiawassee and Tittabawassee that may be utilized as reservoirs for conserving the flow of these two streams.

The Shiawassee and Tittabawassee and their tributaries afford some opportunities for water-power development; but the flow of the Cass is so small in dry seasons that such opportunities are lacking.

The following gaging stations have been maintained in this drainage basin:

Flint River at Flint, Mich., 1903–4.
Cass River at Frankenmuth, Mich., 1908.
Cass River at Bridgeport, Mich., 1908.
Tittabawassee River at Freeland, Mich., 1903–1908.

CASS RIVER AT FRANKENMUTH, MICH.

This station, which is located at the highway bridge at Frankenmuth, Mich., was established February 18, 1908, to obtain data for studying water-supply and pollution problems.

Perrys Creek enters from the south about 5 miles above the section.

The low-water flow is controlled by a power plant above the station. The discharge is affected by ice during the winter periods.

Nearly all the discharge measurements at this station were made by employees of the city engineer of Saginaw, Mich. It is believed that the measurements are reliable and accurate. The gage heights are referred to the city datum of Saginaw, Mich.

Discharge measurements of Cass River at Frankenmuth, Mich., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 28	G. A. Gray	244	2,590	19.45	7,710
June 20	G. A. Lowry	115	330	5.50	103
July 18	do	111	437	6.30	206
September 22	do	112	267	4.60	37
October 23[a]	A. H. Horton	9.5	2.4	3.88	3.3
October 27	Wm. M. O'Neill	114	318	5.01	70

[a] Float measurement.

Daily gage height, in feet, of Cass River at Frankenmuth, Mich., for 1908.

[Observer, Conrad Schriener.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	12.28	16.48	7.10	6.80	5.30	5.20	.....	4.60	4.06	5.00
2	.....	.....	12.18	15.88	7.00	6.70	5.30	5.00	.....	4.40	3.86	4.96
3	.....	.....	11.08	15.08	6.80	6.50	5.20	4.80	.....	4.40	4.92	5.30
4	.....	.....	11.48	14.18	6.80	6.40	5.30	5.00	.....	4.50	5.06	5.45
5	.....	.....	11.73	13.98	6.50	6.00	5.30	5.10	.....	4.60	4.85	5.15
6	.....	.....	11.88	12.38	6.40	5.60	5.40	5.20	.....	4.70	4.56	4.20
7	.....	.....	13.88	12.48	6.60	5.50	5.30	5.30	.....	4.60	4.65	4.45
8	.....	.....	15.03	12.78	12.60	5.50	5.20	5.30	.....	4.20	4.05	5.40
9	.....	.....	13.83	14.58	14.00	5.80	5.00	5.40	.....	4.60	4.55	5.45
10	.....	.....	14.58	14.18	13.90	6.10	4.90	5.40	.....	4.60	4.76	6.35
11	.....	.....	15.58	12.68	12.40	5.80	4.90	5.50	.....	4.00	5.00	6.30
12	.....	.....	16.88	11.98	10.70	5.70	4.80	5.20	.....	4.70	4.85	4.85
13	.....	.....	18.08	10.18	10.90	5.70	4.90	5.10	.....	4.70	4.96	4.45
14	.....	.....	19.38	9.28	13.00	6.10	4.90	5.20	3.85	4.60	4.65	5.25
15	.....	.....	19.58	8.68	17.98	5.90	4.90	5.10	4.15	4.70	4.15	4.65
16	.....	.....	20.98	8.60	17.48	5.80	4.90	5.00	4.85	4.60	5.25	5.20
17	.....	.....	19.88	8.20	16.58	5.70	5.00	5.10	4.60	4.20	5.15	5.35
18	.....	12.88	19.18	8.10	14.48	5.60	5.80	5.30	4.60	3.90	4.95	5.50
19	.....	12.88	18.45	8.70	11.18	5.60	7.00	5.40	4.40	4.60	4.85	5.40
20	.....	12.88	17.48	8.60	9.58	5.50	7.00	5.50	4.40	4.20	4.80	4.35
21	.....	12.88	15.68	8.40	9.20	5.40	6.50	5.50	4.50	4.40	5.00	5.15
22	.....	12.88	15.58	8.20	8.80	5.40	5.90	5.30	4.60	4.50	4.15	5.40
23	.....	12.73	16.18	7.50	8.10	5.50	5.80	5.20	4.60	3.90	4.26	5.40
24	.....	12.58	17.38	7.10	7.60	5.50	5.70	5.40	4.50	4.80	4.80	5.05
25	.....	12.43	18.28	6.70	7.00	5.50	5.60	5.60	4.50	4.00	4.96	4.55
26	.....	12.48	17.18	7.20	6.40	5.40	5.40	5.40	4.60	4.90	4.56	4.60
27	.....	12.48	16.38	7.30	6.20	5.40	5.50	5.10	3.90	5.10	5.05	4.20
28	.....	12.48	19.18	7.40	6.50	5.40	5.40	5.00	3.80	4.92	5.16	5.20
29	.....	12.48	20.08	7.30	6.50	5.40	5.30	.....	4.50	4.65	4.65	5.25
30	.....	.....	19.38	7.20	6.60	5.40	5.30	.....	4.60	4.50	5.00	5.05
31	.....	.....	17.68	.....	6.70	.....	5.20	.....	.....	4.80	.....	5.45

NOTE.—No gage from August 29 to September 13. Discharge probably not materially affected by ice conditions except about February 18 to March 7, when the effect of ice conditions increased the apparent discharge several hundred per cent.

Rating table for Cass River at Frankenmuth, Mich., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
3.80	2	5.30	90	6.80	285	9.60	932
3.90	4	5.40	99	6.90	302	9.80	995
4.00	6	5.50	108	7.00	320	10.00	1,060
4.10	9	5.60	118	7.20	356	11.00	1,420
4.20	14	5.70	129	7.40	394	12.00	1,850
4.30	19	5.80	141	7.60	434	13.00	2,350
4.40	25	5.90	153	7.80	476	14.00	2,910
4.50	31	6.00	165	8.00	520	15.00	3,570
4.60	37	6.10	178	8.20	566	16.00	4,320
4.70	44	6.20	192	8.40	614	17.00	5,190
4.80	51	6.30	206	8.60	663	18.00	6,150
4.90	58	6.40	221	8.80	713	19.00	7,220
5.00	65	6.50	236	9.00	765	20.00	8,360
5.10	73	6.60	252	9.20	818	21.00	9,550
5.20	81	6.70	268	9.40	873		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on 12 discharge measurements made during 1908–9 and is fairly well defined.

Monthly discharge of Cass River at Frankenmuth, Mich., for 1908.

[Drainage area, 863 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March 8–31	9,530	2,810	5,910	6.85	6.11	B.
April	4,720	268	1,500	1.74	1.94	B.
May	6,130	192	1,400	1.62	1.87	B.
June	285	99	140	.162	.18	A.
July	320	51	109	.126	.15	A.
August	118	51	81.9	.095	.11	A.
September	81	2	40.1	.046	.05	B.
October	73	4	33.4	.039	.04	B.
November	86	3	47.2	.055	.06	A.
December	214	14	78.8	.091	.10	B.

NOTE.—Discharge assumed unaffected by ice and open channel rating applied March 8 to December 31. Discharge August 29 to September 13 estimated on the basis of gage-height comparisons with Cass River at Bridgeport.

CASS RIVER AT BRIDGEPORT, MICH.

This station is located at the highway bridge at Bridgeport, Mich., a short distance above the Pere Marquette Railroad crossing. It was established January 31, 1908, to obtain data for studying water-supply problems, and was discontinued October 1, 1908.

Winters are comparatively severe at this point and ice forms to considerable thickness, modifying the relation between discharge and gage heights.

The datum of the gage has remained unchanged; the records may be affected by backwater from Saginaw River.

The Bridgeport station was replaced February 18, 1908, by the Frankenmuth station, which is farther up the river, and less liable to be affected by backwater.

Discharge measurements of Cass River at Bridgeport, Mich., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 27	G. A. Gray	312	2,760	7.65	4,520
March 28[a]	do	763	3,440	9.05	8,530

[a] Water running over road measured.

Daily gage height, in feet, of Cass River at Bridgeport, Mich., for 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	0.5	3.8	8.0	1.6	1.8	−0.7	−0.2	−0.9
2	.....	.6	3.8	8.0	1.4	1.6	− .5	− .4	− .4
3	.....	.4	3.6	7.7	1.2	1.4	− .2	− .8	− .4
4	.....	.1	3.0	6.6	1.0	1.0	− .2	− .75	−1.4
5	.....	.1	2.5	6.4	1.0	.6	− .45	− .6	−1.1
6	.....	.2	3.0	6.3	.8	.4	− .6	− .7	− .9
7	.....	.2	5.0	6.1	1.9	− .2	− .3	− .2	− .4
8	.....	.2	6.8	6.6	5.0	− .1	− .4	.0	−1.1
9	.....	.2	7.3	6.8	6.2	− .1	− .6	− .1	−1.4
10	.....	.2	7.3	6.8	6.5	.0	− .6	− .7	− .7
11	.....	.3	7.4	6.6	6.0	.1	− .7	− .8	− .6
12	.....	.5	7.8	5.8	5.2	.0	− .5	− .8	− .6
13	.....	.9	8.3	5.4	4.7	− .1	− .4	− .7	− .7
14	.....	3.0	8.8	4.8	5.0	− .1	− .45	− .6	− .7
15	.....	4.0	10.0	4.4	7.6	.4	− .4	− .2	− .7
16	.....	4.0	10.9	4.0	8.3	− .1	− .5	.0	−1.0
17	.....	3.6	10.8	3.4	8.0	− .2	− .3	− .5	−1.0
18	.....	3.6	10.0	2.8	7.6	.0	− .1	− .4	− .9
19	.....	3.4	9.7	3.0	7.0	− .2	.5	− .4	− .7
20	.....	3.4	9.0	2.7	6.6	− .3	.6	− .4	− .9
21	.....	3.3	8.6	2.5	6.0	− .2	.2	− .6	−1.2
22	.....	3.3	8.0	2.0	5.4	− .4	.1	− .5	−1.4
23	.....	3.3	8.1	1.6	4.7	− .6	.0	− .3	−1.3
24	.....	3.9	8.0	1.2	3.8	− .6	− .05	− .2	− .9
25	.....	4.0	8.8	1.0	3.2	− .3	− .1	.0	−1.3
26	.....	4.0	8.0	1.6	2.8	− .7	− .25	− .1	−1.3
27	.....	4.0	7.8	1.6	1.7	− .9	− .4	− .5	−1.4
28	.....	3.9	8.8	1.8	1.3	− .9	− .5	− .7	−1.5
29	.....	3.8	10.0	1.7	1.0	− .8	− .55	− .9	−1.9
30	.....	.....	9.5	1.6	1.0	− .6	− .5	−1.0	−1.5
31	.....	.....	8.9	.....	1.6	.....	− .2	−1.0	.....

NOTE.—Ice conditions probably prevailed from about February 1 to March 13.

TITTABAWASSEE RIVER AT FREELAND, MICH.

This station, which is located at the highway bridge at Freeland, Mich., was established August 22, 1903, to obtain data for studying water-power, water-supply, and pollution problems. It was discontinued August 3, 1906, and was reestablished October 28, 1906.

The drainage area above the station is about 2,550 square miles.

Ice forms at the measuring section, and special studies are necessary to determine the flow during the frozen period.

The records are reliable and accurate. The datum of the gage has remained unchanged. The gage reader at this station was paid by Gardner S. Williams during 1907 and part of 1908.

Discharge measurements of Tittabawassee River at Freeland, Mich., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907.					
April 18	A. H. Horton	233	1,580	4.51	3,000
1908.					
October 24	O'Neill and Chapman	216	886	1.63	606
October 28	Wm. M. O'Neill	216	919	1.78	679

Daily gage height, in feet, of Tittabawassee River at Freeland, Mich., for 1907 and 1908.

[Observer, W. E. Denison.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	9.2	6.2	5.65	11.3	8.5	4.0	2.15	1.65	1.4	2.0	2.2	2.1
2	9.0	6.0	5.6	11.0	10.1	3.7	2.2	1.65	1.4	2.0	2.25	2.15
3	8.85	5.9	5.5	10.25	9.0	3.6	2.15	1.6	1.45	1.95	2.3	2.2
4	8.4	5.85	5.45	9.1	8.1	3.45	2.1	1.6	1.45	1.95	2.3	2.3
5	7.65	5.8	5.4	7.65	7.4	3.3	2.0	1.55	1.5	1.95	2.2	2.3
6	7.1	5.7	5.35	6.5	6.0	3.15	2.0	1.55	1.55	1.9	2.15	2.25
7	7.0	5.65	5.35	5.3	5.75	3.05	1.95	1.55	1.6	1.9	2.1	2.25
8	8.2	5.6	5.3	5.3	5.4	3.0	1.9	1.6	1.65	1.85	2.15	2.2
9	8.0	5.55	5.3	5.25	5.15	2.95	1.9	1.6	1.66	1.85	2.0	2.2
10	7.7	5.5	5.3	5.2	4.7	2.8	1.85	1.6	1.7	1.8	2.0	2.25
11	6.2	5.5	6.0	5.15	4.35	2.6	1.85	1.65	1.75	1.8	2.1	2.25
12	5.0	5.45	7.25	5.1	4.0	2.6	1.8	1.65	1.75	1.8	2.25	2.3
13	5.0	5.4	8.1	5.0	4.0	2.6	1.8	1.6	1.8	1.8	2.35	2.3
14	5.0	5.4	9.35	5.0	3.9	2.6	1.8	1.55	1.8	1.85	2.5	2.35
15	5.1	5.35	10.2	4.9	3.85	2.6	1.8	1.5	1.85	1.85	2.6	2.4
16	5.1	5.35	11.1	4.75	3.8	2.5	1.75	1.4	1.85	1.9	2.7	2.55
17	5.15	5.3	11.3	4.65	3.75	2.5	1.7	1.35	1.85	1.95	2.8	2.65
18	5.1	5.3	11.0	4.5	3.7	2.35	1.7	1.35	1.9	1.95	2.9	2.7
19	5.1	5.3	10.8	4.15	3.7	2.3	1.65	1.35	2.0	2.0	3.0	2.85
20	9.7	5.4	10.5	3.9	3.65	2.3	1.6	1.4	2.0	2.0	3.0	3.0
21	12.7	5.45	10.25	3.6	3.6	2.2	1.6	1.4	1.95	2.0	2.9	3.1
22	14.7	5.5	10.0	3.5	3.5	2.25	1.65	1.35	1.9	1.95	2.75	3.0
23	13.6	5.7	10.2	3.5	3.45	2.7	1.65	1.35	1.9	1.9	2.6	3.0
24	12.1	5.9	10.5	3.55	3.4	3.3	1.7	1.3	1.9	1.9	2.45	3.1
25	10.0	5.9	10.7	3.65	3.3	3.6	1.7	1.3	1.95	1.85	2.35	3.2
26	8.5	5.85	10.9	3.8	3.3	3.6	1.7	1.35	1.95	1.9	2.3	3.3
27	7.7	5.8	10.95	4.0	3.35	3.35	1.75	1.35	1.95	1.9	2.25	3.45
28	7.55	5.7	11.2	4.1	3.5	3.0	1.75	1.36	2.0	1.95	2.2	3.55
29	7.0	.....	11.5	4.6	3.7	2.7	1.7	1.4	2.0	2.0	2.2	3.7
30	6.8	.....	11.45	5.35	3.95	2.1	1.7	1.4	2.0	2.0	2.15	3.8
31	6.55	.....	11.3	.....	4.2	.....	1.7	1.4	.....	2.1	.....	3.9
1908.												
1	3.55	3.05	4.3	10.5	6.0	5.15	1.7	1.4	1.4	1.6	1.78	2.0
2	3.5	3.0	4.55	10.0	5.8	4.8	1.7	1.4	1.4	1.65	1.70	2.1
3	3.5	3.0	4.7	9.35	5.65	4.55	1.8	1.35	1.4	1.65	1.65	2.15
4	3.45	3.1	4.8	9.0	5.4	4.0	1.8	1.4	1.4	1.6	1.61	2.2
5	3.45	3.1	4.95	8.6	5.15	3.55	1.8	1.4	1.4	1.6	1.60	2.2
6	3.45	3.0	5.0	8.4	5.0	3.15	1.9	1.4	1.3	1.55	1.60	2.25
7	3.5	3.0	5.2	8.65	5.85	2.55	1.9	1.35	1.3	1.55	1.61	2.35
8	3.55	3.0	5.3	9.1	6.25	2.45	1.9	1.3	1.25	1.55	1.63	.....
9	3.5	3.0	6.7	9.85	6.9	2.4	1.8	1.3	1.3	1.5	1.65	.....
10	3.45	3.1	8.0	10.2	6.65	2.35	1.8	1.3	1.3	1.5	1.63	.....
11	3.45	3.25	9.3	9.0	7.0	2.3	1.7	1.4	1.3	1.5	1.62	.....
12	3.4	3.4	10.5	8.2	7.55	2.3	1.7	1.4	1.3	1.55	1.63	.....
13	3.4	3.55	11.0	8.0	9.2	2.25	1.6	1.5	1.35	1.55	1.64	.....
14	3.35	3.7	12.6	7.75	10.9	2.2	1.6	1.5	1.35	1.6	1.63	.....
15	3.35	3.8	14.5	7.5	11.0	2.1	1.5	1.5	1.35	1.55	1.63	.....
16	3.35	3.9	14.1	7.28	11.0	2.05	1.5	1.6	1.3	1.55	1.62	.....
17	3.3	4.0	13.7	7.0	10.1	2.0	1.7	1.6	1.4	1.5	1.63	.....
18	3.3	4.1	12.95	6.2	9.0	2.0	2.1	1.6	1.4	1.5	1.65	.....
19	3.35	4.15	11.9	5.45	7.75	1.95	2.4	1.6	1.4	1.55	1.65	.....
20	3.35	4.2	10.75	4.75	6.55	1.95	2.4	1.6	1.4	1.55	1.64	.....
21	3.3	4.2	9.5	4.0	5.5	1.9	2.4	1.6	1.4	1.6	1.65	.....
22	3.3	4.2	9.2	3.65	4.8	1.9	2.4	1.6	1.4	1.55	1.65	.....
23	3.3	4.25	10.2	3.7	4.45	1.85	2.2	1.6	1.4	1.55	1.63	.....
24	3.25	4.3	10.4	3.95	4.1	1.8	2.0	1.6	1.5	1.6	1.63	.....
25	3.2	4.3	10.1	4.3	3.8	1.8	1.9	1.5	1.5	1.6	1.64	.....
26	3.2	4.25	10.0	4.75	3.65	1.75	1.8	1.5	1.4	1.65	1.64	.....
27	3.15	4.25	10.5	5.0	4.55	1.7	1.7	1.4	1.4	1.65	1.65	.....
28	3.15	4.3	10.9	5.6	5.6	1.65	1.5	1.4	1.5	1.85	1.60	.....
29	3.1	4.3	11.2	5.8	5.45	1.6	1.5	1.4	1.5	1.85	1.69	.....
30	3.1	.....	11.0	6.0	5.2	1.65	1.5	1.4	1.5	1.83	2.00	.....
31	3.05	.....	10.75	.....	5.0	.....	1.4	1.4	.....	1.8	.....	.....

NOTE.—Ice conditions probably prevailed until about the middle of March and from about December 14 to 31, 1907, and prevailed from about January 1 to March 23 and December 4 to 31, 1908.

LAKE ERIE DRAINAGE BASIN.

GENERAL FEATURES.

The drainage basin of Lake Erie within the United States covers the northern third of Ohio, a small corner of northeastern Indiana, and a similar area in southeastern Michigan. South of the lake the drainage area is narrow, the divide lying in places scarcely 50 miles back from the lake shore. To the west the width of the area is greater, and the Maumee, which enters the lake near Toledo, is the largest stream of northern Ohio. The average altitude of the watershed above Lake Erie is 500 feet, but the head of the Maumee at Fort Wayne, Ind., is only 170 feet above the lake. The surface is level or gently rolling.

The principal streams are Huron and Raisin rivers, which enter the lake from the Michigan corner, and Maumee, Black, and Cuyahoga rivers, which enter from Ohio. Of these, the Maumee, formed by the junction of St. Marys and St. Joseph rivers at Fort Wayne, Ind., is the most important.

HURON RIVER DRAINAGE BASIN.

DESCRIPTION.

The drainage basin of Huron River lies in the southeastern part of Michigan. The river rises in several small lakes near Pontiac, in Oakland County, flows southwestward until it enters Washtenaw County, and then turns to the southeast and joins Lake Erie near the mouth of Detroit River. Its length, not following the bends of the river, is about 80 miles; and its total drainage area comprises about 1,060 square miles. The only important tributary is Mill Creek, which enters on the right bank at Dexter, Mich.

The drainage basin is irregularly shaped, having its greatest length, about 50 miles, parallel to and lying at a distance of 25 to 30 miles from Detroit River. This basin is connected with Lake Erie by a long narrow valley averaging not more than 5 miles in width, extending from a point near Ypsilanti southeastward to Lake Erie, a distance of 28 miles. In this portion of its course a large part of the total fall of the river occurs.

The northern part of the catchment area is rolling and its topography is complex. The stream flows through a series of lakes, and north of Dover the entire basin is largely composed of lakes and surrounding marshes. In the vicinity of Ann Arbor the topography is very rolling. Below Ypsilanti the drainage basin is flat.

The sources of the river have an elevation of about 900 feet above sea; at Portage Lake, where the river turns and flows southeastward, the elevation is 850 feet; at Ypsilanti the elevation is 690 feet; at the mouth of the river the elevation is 573 feet.

There are no forested areas in this section. The mean annual rainfall is about 35 inches. The winters are comparatively mild, the snowfall is not heavy, and ice does not form very thick.

Storage possibilities have not been investigated, but as lakes and swamps abound there must be excellent sites for reservoirs.

The conditions for water power on this stream are nearly ideal, as nearly the entire catchment area is situated above the portion of the river that is most suited for the location of dams, and the numerous lakes and swamps afford a natural storage and produce a steady flow. There are a few developed sites below Ann Arbor, and there are opportunities for others in this stretch of the river.

The following gaging stations have been maintained in this drainage basin:

Huron River at Dover, Mich., 1904.
Huron River at Dexter, Mich., 1904–1908.
Huron River at Geddes, Mich., 1904–1908.
Huron River at French Landing, Mich., 1904–5.
Huron River at Flat Rock, Mich., 1904–1908.

HURON RIVER AT DEXTER, MICH.

This station, which is located at the highway bridge at Dexter, Mich., was established September 1, 1904, to obtain data for use in studying water-power, water-supply, and pollution problems.

Mill Creek enters a short distance above the station.

On March 12, 1908, the staff gage which was in use until that time was carried out by the ice; a chain gage was installed March 26, 1908, at the same datum as the staff gage. As the current is swift at the section, little ice forms and the gage heights are only slightly affected thereby.

The datum of the gage has remained unchanged.

The high water that carried away the gage produced a permanent change in the bed of the river and altered the relation between the gage heights and discharge which existed prior to March 12, 1908.

A small headrace runs to an abandoned mill on the left bank, but at ordinary and low stages there is little or no flow in this canal; at high stages a small amount of water may pass around the gage through this raceway.

The service of the gage reader at this station is paid by the Washtenaw Light and Power Company, Ann Arbor.

The discharge measurements taken at this station plot very erratically, and any estimates of discharges attempted on the basis of the records which follow should be used with great caution.

Discharge measurements of Huron River at Dexter, Mich., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 16	A. H. Horton	175	285	1.51	939
1908.					
October 17	O'Neill and Chapman	88	142	−.19	138

Daily gage height, in feet, of Huron River at Dexter, Mich., for 1907 and 1908.

[Observer, Elisha White.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.20	2.28	1.12	2.00	2.10	1.35	0.75	0.75	0.38	1.38	0.95	1.00
2	2.20	2.05	1.40	2.00	2.08	1.40	.70	.75	.50	1.30	1.10	1.00
3	2.30	2.00	1.40	2.00	2.00	1.38	.65	.75	.50	1.30	1.20	.98
4	2.80	2.00	1.38	1.92	2.00	1.35	.65	.75	.55	1.30	1.15	.95
5	2.70	2.00	1.30	1.82	1.98	1.35	.65	.72	.60	1.25	1.15	.92
6	2.58	2.00	1.25	1.78	1.90	1.32	.65	.70	.60	1.25	1.10	.90
7	2.65	2.00	1.20	1.68	1.88	1.30	.60	.70	.60	1.25	1.10	.90
8	3.30	1.92	1.20	1.58	1.78	1.25	.60	.70	.60	1.22	1.08	.90
9	3.30	1.85	1.20	1.50	1.70	1.20	.60	.68	.62	1.18	1.02	.90
10	3.00	1.75	1.20	1.50	1.62	1.20	.60	.65	.65	1.08	1.00	1.05
11	2.78	1.55	1.15	1.50	1.52	1.20	.70	.60	.65	1.05	1.00	1.10
12	2.68	1.35	1.50	1.55	1.48	1.20	1.00	.58	.62	1.00	.98	1.10
13	2.60	1.18	1.80	1.60	1.38	1.20	.98	.55	.62	1.00	.95	1.08
14	2.52	1.15	1.80	1.60	1.30	1.20	.90	.52	.60	.95	.95	1.05
15	2.35	1.15	1.80	1.52	1.25	1.20	.90	.50	.60	.90	.95	1.02
16	2.18	1.10	1.90	1.50	1.40	1.15	1.00	.50	.60	.90	.95	1.00
17	2.12	1.10	2.00	1.48	1.35	1.10	.92	.50	.60	.90	.95	1.00
18	2.10	1.10	2.00	1.45	1.35	1.05	.85	.50	.95	.90	.95	1.00
19	2.50	1.12	2.00	1.40	1.35	1.02	.80	.50	1.00	.85	.95	1.00
20	3.30	1.20	2.00	1.35	1.30	1.00	.80	.45	1.00	.85	.95	1.00
21	3.10	1.20	2.00	1.30	1.25	1.00	.80	.40	1.00	1.00	1.12	.95
22	2.90	1.20	2.00	1.25	1.20	.95	.80	.40	.95	1.00	1.20	.95
23	2.80	1.20	2.00	1.20	1.30	.90	.80	.40	.90	.95	1.18	1.00
24	2.70	1.20	2.00	1.20	1.30	.90	.80	.35	.85	.92	1.15	1.05
25	2.68	1.18	2.00	1.20	1.30	.90	1.00	.28	.80	.90	1.15	1.05
26	2.60	1.12	2.00	1.12	1.40	.90	1.10	.25	.82	.90	1.10	1.05
27	2.58	1.10	2.05	1.10	1.50	.82	1.05	.25	.80	.90	1.10	1.35
28	2.48	1.10	2.35	1.10	1.50	.80	.90	.25	.95	1.00	1.05	2.00
29	2.40	.....	2.40	1.10	1.50	.80	.85	.25	1.50	.98	1.05	2.15
30	2.35	.....	2.35	1.65	1.45	.78	.80	.25	1.48	.95	1.00	2.60
31	2.35	.....	2.28	.....	1.40	.....	.75	.25	.....	.95	.....	2.60
1908.												
1	2.60	1.42	1.30	2.65	.45	.98	.00	−.25	.00	−.30	−.15	.10
2	2.58	1.52	1.18	2.52	.40	.90	−.05	−.30	.00	−.30	−.15	.10
3	2.55	1.65	1.15	2.40	.40	.82	−.10	−.30	.00	−.30	−.15	.05
4	2.50	1.70	1.10	2.25	.38	.80	−.10	−.10	.00	−.30	−.15	.05
5	2.38	1.80	1.00	2.15	.30	.80	−.10	.00	−.10	−.30	−.20	.00
6	2.28	2.00	2.38	2.12	.30	.75	−.10	.00	−.10	−.30	−.20	.00
7	2.20	2.00	5.00	2.00	.55	.68	−.10	−.05	−.15	−.30	−.20	.00
8	2.10	1.95	4.60	2.08	.90	.58	−.15	−.08	−.18	−.20	−.20	.00
9	1.95	1.88	4.10	2.02	.88	.48	−.15	−.18	−.18	−.20	−.20	.00
10	1.75	1.80	3.60	1.95	.80	.38	−.15	−.20	−.18	−.20	−.22	.00
11	1.68	1.72	3.80	1.75	.80	.28	−.15	−.20	−.20	−.15	−.25	−.05
12	1.62	1.60	4.00	1.58	.75	.20	−.15	−.05	−.20	−.10	−.25	−.05
13	1.60	1.80	.....	1.48	.75	.15	−.15	.00	−.20	−.12	−.25	−.05
14	1.52	3.20	.....	1.38	1.30	.12	−.15	.00	−.20	−.15	−.25	−.05
15	1.38	4.90	.....	1.30	1.55	.10	−.18	.00	−.20	−.15	−.25	−.05
16	1.30	4.55	.....	1.28	1.60	.10	−.20	.00	−.20	−.15	−.25	−.05
17	1.28	4.40	.....	1.18	1.48	.05	−.20	.00	−.20	−.20	−.25	.05
18	1.20	4.35	.....	1.10	1.40	.05	−.10	.00	−.20	−.25	−.25	.10
19	1.20	4.25	.....	1.08	1.60	.02	−.10	.00	−.20	−.25	−.25	.10
20	1.20	4.15	.....	.98	1.88	.00	−.18	.00	−.20	−.30	−.25	.10
21	1.25	4.00	.....	.88	1.75	.15	−.20	.00	−.20	−.30	−.25	.10
22	1.68	3.70	.....	.78	1.50	.15	−.20	.00	−.22	−.30	−.25	.10
23	1.50	3.25	2.72	.72	1.25	.15	−.20	.00	−.25	−.30	−.22	.10
24	1.45	2.95	2.72	.68	1.08	.10	−.20	.00	−.25	−.05	−.10	.10
25	1.28	2.60	2.67	.65	.95	.02	−.20	.00	−.25	.00	.00	.05
26	1.20	2.30	2.46	.62	.82	−.10	−.20	.00	−.25	−.02	.00	.00
27	1.20	2.15	2.32	.58	.70	−.15	−.25	.00	−.25	−.08	.00	.00
28	1.28	1.85	2.70	.52	.68	−.15	−.25	.00	−.28	−.10	.00	.00
29	1.50	1.70	3.00	.60	.60	−.10	−.25	.00	−.30	−.10	−.02	.00
30	1.50	.....	2.95	.52	1.10	.00	−.25	.00	−.30	−.10	.00	.05
31	1.48	.....	2.78	.....	1.10	.....	−.25	.00	.....	−.10	.....	.10

NOTE.—Gage out March 13 to 22, 1908.

HURON RIVER AT GEDDES, MICH.

This station is located at the power plant of the Washtenaw Light and Power Company at Geddes, Mich. It was established February 1, 1904, to obtain data for studying water-power, water-supply, and pollution problems.

Fleming Creek is tributary from the north about one-half mile below the station. The flow of the river at this point is determined by computing the flow through the turbines by knowing the gate opening, rating of the wheels, and the number of hours the turbines are run; the flow over the crest of the dam is determined by considering the dam as a weir, the proper coefficient to be applied being assumed.

The records at this station are furnished by the Washtenaw Light and Power Company, of Ann Arbor, Mich. The computations of the discharge are furnished by Gardner S. Williams.

Daily discharge, in second-feet, of Huron River at Geddes, Mich., for 1906, 1907, and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1906.												
1	441	699	449	a 623	416	372	a 56	225	97	151	250	321
2	310	544	428	618	454	352	170	197	a 86	90	265	a 256
3	372	507	749	713	454	a 291	184	182	89	97	318	270
4	374	a 538	a 670	571	400	289	132	198	98	112	a 230	263
5	468	384	619	599	410	227	166	a 200	93	102	190	276
6	372	482	602	578	a 376	236	152	164	92	155	221	700
7	a 298	431	550	574	368	223	132	190	95	a 133	211	718
8	350	418	551	a 526	342	316	a 82	192	93	134	204	658
9	321	407	559	614	363	593	143	176	a 57	115	194	a 618
10	356	412	552	709	374	a 642	178	198	100	124	205	516
11	399	a 339	a 504	709	364	523	155	214	95	135	a 186	514
12	381	364	498	667	362	538	163	a 143	75	137	199	524
13	363	357	483	641	a 325	478	134	172	95	131	170	559
14	a 206	402	496	837	677	368	155	129	81	a 102	184	537
15	428	294	457	a 862	891	376	a 73	140	98	117	183	598
16	579	349	434	856	760	399	132	135	a 40	147	147	a 537
17	457	340	413	739	584	a 365	130	133	100	127	220	460
18	491	a 319	a 397	698	469	347	134	149	80	93	a 211	422
19	464	297	407	653	444	328	122	a 104	68	112	230	404
20	770	353	414	687	a 407	324	120	145	66	120	292	420
21	a 1,330	382	227	608	400	266	136	128	84	a 105	418	444
22	1,500	410	419	a 626	359	215	a 95	134	93	117	405	402
23	1,320	394	352	530	328	220	135	196	a 44	107	478	a 208
24	1,320	404	328	550	385	a 200	145	160	58	119	442	322
25	1,210	a 521	a 300	494	375	246	163	159	51	139	a 343	298
26	1,120	574	502	508	366	224	144	a 117	98	135	389	272
27	1,100	536	759	490	a 387	142	92	115	94	188	378	330
28	a 1,180	471	810	459	626	170	111	118	74	a 196	374	285
29	1,060	.....	734	a 439	652	222	a 176	116	122	241	304	296
30	962	.....	654	417	514	168	364	98	a 88	240	335	a 320
31	952	.....	659	.....	448	.....	313	97	.....	288	.....	1,120
1907.												
1	1,140	558	305	1,240	1,370	611	285	209	a 59	541	266	a 289
2	813	652	738	1,160	1,340	a 571	252	236	124	451	356	288
3	1,000	a 507	a 634	1,150	1,130	575	205	224	143	407	a 520	294
4	1,470	570	651	1,110	1,150	534	157	a 207	148	448	346	264
5	1,070	507	581	1,020	a 1,110	545	194	210	152	473	386	256

a Sunday.

Daily discharge, in second-feet, of Huron River at Geddes, Mich., for 1906, 1907, and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
6	a1,040	377	498	961	1,100	536	221	171	173	a468	394	248
7	1,050	347	518	a967	1,140	515	a89	204	174	415	444	254
8	1,540	333	472	925	1,070	500	220	150	a142	374	402	a230
9	1,570	365	461	952	1,010	a506	140	158	211	362	386	327
10	1,200	a343	a488	921	915	420	126	129	181	336	a407	408
11	1,160	285	520	863	870	482	211	a152	181	355	368	402
12	1,060	281	771	893	a862	475	310	139	156	290	329	348
13	a950	276	1,010	890	814	456	331	154	151	a365	329	357
14	936	346	912	a873	542	433	a216	157	130	256	340	348
15	931	329	852	858	588	461	294	139	a136	253	326	a333
16	737	383	810	883	628	a425	327	128	155	246	302	322
17	738	a400	a802	828	532	381	273	125	148	257	a258	316
18	696	405	808	826	620	382	191	a150	300	254	267	336
19	1,170	429	760	782	a642	358	250	105	286	248	280	323
20	a1,970	505	782	762	501	360	236	123	285	a278	287	301
21	1,140	369	716	a721	503	342	a232	136	269	306	400	352
22	964	348	705	695	454	325	262	111	a358	253	428	a335
23	733	342	719	635	587	a279	222	107	245	256	414	321
24	628	a302	a760	623	580	270	236	78	209	257	a340	379
25	623	332	756	583	530	289	272	a57	228	242	418	378
26	613	321	725	614	a579	322	358	56	254	270	406	385
27	a777	299	755	754	907	280	422	44	223	a199	413	518
28	681	295	970	a532	739	232	a186	98	285	328	354	1,300
29	740	.....	1,030	585	730	258	241	75	a544	289	345	a1,140
30	649	.....	927	1,160	691	a487	245	82	588	268	345	1,340
31	579	.....	a870	.....	683	.....	224	150	.....	259	.....	1,300
1908.												
1	2,010	282	a629	1,280	566	574	138	93	254	78	a77	298
2	1,200	a386	716	1,200	400	519	135	a36	190	94	182	300
3	1,070	366	577	1,320	a408	490	146	113	232	84	179	270
4	1,040	268	559	1,370	345	431	99	109	178	a104	162	378
5	a1,030	300	619	a1,200	390	454	a127	392	146	98	176	263
6	784	258	1,860	1,230	349	427	71	258	a92	94	167	a144
7	843	273	3,400	1,160	412	a441	85	222	101	80	149	317
8	783	329	a2,940	1,180	508	324	76	182	169	129	a125	187
9	661	a339	2,700	1,150	558	370	84	a120	208	96	158	210
10	641	295	2,630	1,120	a558	403	79	102	204	111	144	180
11	586	271	3,030	1,100	423	212	140	110	206	a123	154	261
12	a840	257	3,160	a958	409	209	a65	156	151	236	146	183
13	725	1,080	3,360	896	514	204	82	424	a119	120	135	a161
14	534	1,940	3,250	834	840	a277	91	364	167	140	138	225
15	569	2,830	a3,100	847	962	266	140	313	148	144	a136	207
16	600	a2,150	3,180	859	986	103	90	a316	120	156	150	205
17	420	2,060	2,970	788	a941	192	124	445	142	147	141	220
18	521	1,720	2,730	721	826	179	137	493	101	a146	130	229
19	a479	1,590	2,390	a798	846	288	a82	409	122	123	136	334
20	453	1,400	2,330	695	946	136	134	397	a91	135	80	a239
21	496	1,280	2,030	690	1,090	a298	92	394	122	121	158	314
22	651	1,270	a2,040	635	842	309	79	438	117	119	a198	210
23	605	a1,250	1,590	609	689	95	84	a225	108	140	186	187
24	520	1,140	1,720	534	a691	165	75	317	107	200	89	204
25	494	1,140	1,380	540	638	60	99	317	118	a204	165	226
26	a478	1,000	1,250	a508	481	59	a102	317	138	198	123	310
27	411	960	1,220	566	489	113	83	250	a144	192	211	a178
28	459	793	1,770	524	484	a101	60	190	114	176	206	225
29	356	755	a1,740	498	425	140	93	265	111	192	a141	205
30	313	.....	1,620	498	695	146	38	a250	76	170	244	239
31	292	.....	1,470	.....	a735	.....	46	315	.....	216	.....	233

a Sunday.

Monthly discharge of Huron River at Geddes, Mich., for 1906, 1907, and 1908.

[Drainage area, 757 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1906.					
January	1,500	206	686	0.906	1.04
February	699	294	426	.563	.59
March	810	227	515	.680	.78
April	862	417	620	.819	.91
May	891	325	454	.600	.69
June	642	142	322	.425	.47
July	364	56	148	.196	.23
August	225	97	156	.206	.24
September	122	40	83.6	.110	.12
October	288	90	139	.184	.21
November	478	147	272	.359	.40
December	1,120	208	447	.590	.68
The year	1,500	40	356	.470	6.36
1907.					
January	1,970	579	980	1.29	1.49
February	652	276	386	.510	.53
March	1,030	305	720	.951	1.10
April	1,240	532	859	1.13	1.26
May	1,370	454	804	1.06	1.22
June	611	232	410	.542	.60
July	422	88.8	240	.317	.37
August	236	44	138	.182	.21
September	588	58.8	221	.292	.33
October	541	199	316	.417	.48
November	520	258	362	.478	.53
December	1,340	230	452	.597	.69
The year	1,970	44	491	.647	8.81
1908.					
January	2,010	292	673	.889	1.02
February	2,830	257	965	1.27	1.37
March	3,400	559	2,060	2.72	3.14
April	1,370	498	877	1.16	1.29
May	1,090	345	627	.828	.95
June	574	59	266	.351	.39
July	146	38	96	.127	.15
August	493	36	269	.355	.41
September	254	76	143	.189	.21
October	236	78	141	.186	.21
November	244	77	153	.202	.23
December	378	144	237	.313	.36
The year	3,400	36	542	.716	9.73

HURON RIVER AT FLAT ROCK, MICH.

This station, which is located at the highway bridge at Flat Rock, Mich., about one-half mile below the crossing of the Detroit, Toledo and Ironton Railroad, was established August 6, 1904, to obtain data for use in studying water-power, water-supply, and pollution problems.

No important tributaries enter near the gaging station.

The ordinary flow of the stream is controlled by a dam and power plant immediately above the station, but as the river is very steady the dam produces very little artificial control. The nearness of the mill to the section prevents the formation of ice in winter at the

gaging section, but jams frequently form below the station, causing backwater.

The datum of the gage has remained unchanged. The records are reliable and accurate.

The services of the gage reader at this station are paid by the Washtenaw Light and Power Company, Ann Arbor, Mich.

Discharge measurements of Huron River at Flat Rock, Mich., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
April 16	A. H. Horton	100	412	3.53	906
April 17	do	100	401	3.54	884
1908.					
October 16	O'Neill and Chapman	95	116	.58	152

Daily gage height, in feet, of Huron River at Flat Rock, Mich., for 1907 and 1908

[Observer, C. L. Metler.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	6.75	6.2	3.35	4.95	4.3	3.10	1.45	1.65	.7	3.05	1.9	2.1
2	7.1	6.2	4.05	4.7	5.5	3.20	1.65	1.5	.65	2.8	2.0	1.95
3	6.65	5.7	4.9	4.55	5.2	3.15	1.7	1.55	.7	2.5	2.1	2.1
4	6.45	5.05	5.15	4.4	4.7	3.1	1.4	1.45	.85	2.4	2.6	2.15
5	6.6	4.75	4.8	4.4	4.35	3.1	1.2	1.6	.....	2.45	2.55	2.25
6	6.0	4.65	4.6	4.35	4.4	3.05	1.35	1.8	.80	2.35	2.45	2.0
7	5.55	4.3	4.4	4.05	4.3	2.95	1.35	1.55	.90	2.25	2.35	2.0
8	5.95	4.25	4.45	4.0	4.35	2.85	.95	1.45	1.05	2.4	2.25	1.85
9	6.6	4.15	4.2	4.0	4.15	2.7	1.25	1.4	1.05	2.3	2.2	1.6
10	6.65	4.0	4.0	3.95	3.95	2.6	1.25	1.2	1.25	2.15	1.95	2.0
11	5.7	3.9	4.1	3.8	3.65	2.65	1.25	1.2	1.3	2.15	2.1	2.4
12	5.85	3.8	4.75	3.7	3.45	2.95	1.25	1.15	1.3	2.0	2.25	2.4
13	5.15	3.7	6.1	3.65	3.3	3.55	1.85	1.15	1.5	1.95	2.15	1.75
14	4.8	3.75	6.75	3.55	3.15	3.7	2.0	1.05	1.25	2.05	2.25	1.65
15	4.95	3.85	6.45	3.6	3.05	3.3	1.75	1.1	1.15	2.05	2.1	2.0
16	4.85	3.9	6.0	3.55	3.05	2.65	2.15	1.0	1.0	2.0	2.0	2.25
17	4.2	4.0	5.2	3.55	3.05	2.45	2.05	.95	1.4	1.8	1.8	2.3
18	4.45	4.1	4.95	3.55	3.1	2.35	2.0	.95	1.4	1.7	1.8	2.25
19	5.1	4.3	4.75	3.4	3.15	2.15	1.6	.95	1.8	1.75	2.05	2.25
20	6.25	4.45	4.75	3.25	3.05	2.15	1.65	1.0	1.85	1.75	1.9	1.85
21	7.25	4.4	4.8	3.05	3.0	2.1	1.6	1.05	1.85	1.95	2.15	1.2
22	6.4	4.05	4.75	2.6	2.85	2.1	1.45	.85	1.75	2.0	2.6	2.1
23	8.0	3.8	4.65	3.65	2.8	2.0	1.7	.85	1.65	1.85	2.75	2.15
24	7.5	3.8	4.65	3.05	2.8	1.95	1.45	.85	1.8	1.8	2.6	2.95
25	7.35	3.85	4.8	2.5	2.85	2.1	1.5	.75	1.6	1.8	2.5	2.8
26	6.9	3.9	4.8	2.5	2.95	2.0	1.65	.75	1.5	1.85	2.7	2.75
27	6.8	3.55	4.9	2.45	3.1	1.95	1.9	.6	1.55	1.65	2.5	3.2
28	6.8	3.4	5.3	2.4	2.6	1.9	1.95	.70	1.65	1.75	2.5	5.3
29	6.65	.....	5.9	2.4	3.7	1.75	1.8	.85	1.8	2.0	2.25	6.75
30	6.55	.....	5.65	2.95	3.55	1.5	1.6	.7	2.5	2.05	2.15	7.55
31	6.4	.....	5.3	.....	3.2	.....	1.7	.55	.....	1.95	.....	7.3
1908.[a]												
1	6.95	3.85	7.1	6.9	3.05	4.0	1.55	.85	1.35	.85	1.1	1.4
2	6.1	3.4	6.9	6.7	3.0	3.8	1.35	.65	1.35	85	.95	1.55
3	5.4	3.3	6.85	6.65	2.95	3.55	1.35	.8	1.4	.8	1.05	1.4
4	4.9	3.65	6.5	6.35	2.9	3.35	1.25	.45	1.4	.6	1.15	1.95
5	4.6	3.35	6.5	6.05	2.95	3.25	1.2	.6	1.15	.5	1.15	1.45

[a] See note at end of table, next page.

Daily gage height, in feet, of Huron River at Flat Rock, Mich., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
6	4.35	3.3	7.45	6.0	2.75	3.15	1.15	1.25	1.05	.95	1.25	1.45
7	4.85	3.4	.....	6.1	2.85	3.05	1.45	1.45	.65	.8	1.2	1.45
8	4.55	3.45	.....	6.05	3.25	3.0	1.2	1.05	.4	.8	1.05	1.5
9	4.0	3.35	.....	6.0	3.8	2.85	1.15	1.15	.8	.8	1.1	1.65
10	4.2	3.35	.....	6.05	3.75	2.6	1.2	.8	.75	.95	1.2	1.7
11	5.4	3.65	.....	5.75	3.5	2.5	1.35	1.05	.9	.85	1.25	1.5
12	5.5	3.8	.....	5.4	3.35	2.25	.8	1.3	.9	.8	1.15	1.45
13	6.5	4.2	.....	5.0	3.4	2.2	.8	1.65	.85	1.1	1.1	1.4
14	7.55	6.2	.....	4.85	3.85	2.3	.8	2.0	.6	1.15	1.15	1.1
15	8.05	8.0	.....	4.75	4.95	2.15	1.05	1.8	.75	1.05	1.05	1.55
16	7.35	.....	.....	4.7	5.55	2.1	1.15	1.6	1.05	.95	1.15	1.25
17	6.75	.....	.....	4.5	5.45	2.05	1.05	1.7	.95	1.0	1.3	1.3
18	6.1	.....	.....	4.5	5.2	1.85	1.0	2.15	.85	.85	1.15	1.55
19	6.35	.....	.....	4.5	4.7	1.85	.65	2.2	.35	.85	1.2	1.7
20	6.0	.....	.....	4.35	4.6	1.75	.5	2.05	.9	.8	1.15	1.45
21	6.25	.....	7.85	4.1	5.1	1.95	.95	1.7	.55	.8	1.15	1.3
22	6.3	.....	7.6	3.8	5.25	2.25	1.1	1.65	.9	.9	1.1	1.65
23	6.5	.....	7.35	3.65	4.85	2.1	1.1	1.65	.85	.8	1.05	1.5
24	4.5	.....	7.2	3.5	4.1	1.8	.8	1.45	.85	.95	1.0	1.65
25	4.3	.....	6.85	3.4	3.8	1.6	.65	1.55	.65	1.15	1.1	1.5
26	4.9	.....	6.6	3.3	3.45	1.4	.5	1.45	.75	1.1	1.1	1.35
27	4.4	.....	6.4	3.25	3.4	1.3	.75	1.45	.75	1.7	1.15	1.65
28	4.1	7.65	6.55	3.4	3.25	1.05	.55	1.35	.8	1.3	1.45	1.2
29	3.85	7.45	7.05	3.3	3.15	1.1	.8	1.25	.8	2.0	1.2	1.85
30	4.1	.....	7.35	3.25	3.2	1.55	.8	1.25	.75	1.05	1.1	1.6
31	3.5	.....	7.25	.....	3.85	.....	.8	.9	.....	1.1	.....	1.6

NOTE.—Ice conditions below the gaging section causing backwater at the gage probably prevailed from about January 23 to March 11, 1907, and from about January 11 to February 13 and from about February 20 to March 5, 1908. Water above the gage February 16 to 27 and March 7 to 20, 1908.

Rating table for Huron River at Flat Rock, Mich., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.30	109	1.70	379	3.10	757	5.00	1,380
0.40	124	1.80	403	3.20	787	5.20	1,450
0.50	140	1.90	427	3.30	818	5.40	1,520
0.60	157	2.00	452	3.40	849	5.60	1,590
0.70	174	2.10	477	3.50	880	5.80	1,660
0.80	192	2.20	503	3.60	911	6.00	1,730
0.90	211	2.30	529	3.70	943	6.20	1,800
1.00	230	2.40	556	3.80	975	6.40	1,870
1.10	250	2.50	583	3.90	1,007	6.60	1,940
1.20	270	2.60	611	4.00	1,040	6.80	2,010
1.30	291	2.70	639	4.20	1,106	7.00	2,080
1.40	312	2.80	668	4.40	1,173	8.00	2,480
1.50	334	2.90	697	4.60	1,241		
1.60	356	3.00	727	4.80	1,310		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on five discharge measurements made during 1906–1908 and the form of the 1906 curve. It is well defined between gage heights 0.5 foot and 4 feet. This curve is probably also better for 1906 in place of the one used in Water-Supply Paper No. 206.

Monthly discharge of Huron River at Flat Rock, Mich., for 1907 and 1908.

[Drainage area, 1,000 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,180	.....	1,490	1.49	1.72	C.
February	.....	.....	700	.700	.73	D.
March	1,990	.....	1,290	1.29	1.49	C.
April	1,360	556	903	.903	1.01	A.
May	1,560	611	909	.909	1.05	A.
June	943	334	610	.610	.68	A.
July	490	220	357	.357	.41	B.
August	403	148	253	.253	.29	B.
September	583	166	306	.306	.34	B.
October	742	368	475	.475	.55	A.
November	654	403	517	.517	.58	A.
December	2,300	270	689	.689	.79	B.
The year	2,300	148	708	.708	9.64	
1908.						
January	2,060	.....	1,030	1.03	1.19	D.
February	.....	.....	1,490	1.49	1.61	D.
March	.....	.....	2,860	2.86	3.30	C.
April	2,040	802	1,340	1.34	1.50	A.
May	1,570	654	1,000	1.00	1.15	A.
June	1,040	240	550	.550	.61	A.
July	345	140	231	.231	.27	B.
August	503	132	309	.309	.36	B.
September	312	116	207	.207	.23	B.
October	452	140	227	.227	.26	B.
November	323	220	258	.258	.29	B.
December	440	250	336	.336	.39	B.
The year	.....	.....	820	.820	11.16	

NOTE.—Discharge during the periods of ice conditions 1907–8, and during the period when the water was over the gage, were estimated on the basis of comparison with the discharge at Geddes and climatological reports. Discharge January 23 to 31, 1907, 1,020 second-feet; March 1 to 11, 1907, 950 second-feet; January 11 to 31, 1908, 860 second-feet; February 1 to 13, 1908, 600 second-feet; February 16 to 29, 1908, 2,230 second-feet; March 1 to 5, 1908, 1,100 second-feet; March 7 to 20, 1908, 4,100 second-feet.

LAKE ONTARIO DRAINAGE BASIN.

GENERAL FEATURES.

In the northwestern part of the State of New York, between Niagara and St. Lawrence rivers, is an area aggregating 12,400 square miles drained by streams which flow into Lake Ontario. The divide which controls this drainage is very irregular. Extending to the south and southeast from Fort Niagara, it passes around the headwaters of the Genesee a short distance into Pennsylvania; thence reentering New York it runs southward and eastward from the interior group of lakes, turns to the north, encircles the sources of Black River, turns again to the west, and descends to the lake. The country thus included is level or gently undulating in the counties bordering the lake, but farther south it becomes more rolling, and a series of ridges, gradually increasing in height, stretch down between Cayuga and Seneca and their companion lakes, finally becoming merged with the elevated, broken country forming the principal divide, the abrupt slopes of which attain altitudes of from 2,000 to 2,500 feet about the headwaters of the Genesee.

The easterly or Black River lobe of the drainage basin receives the run-off from the southwestern slope of the Adirondack Mountains—largely a rugged and forest-covered area receiving heavy precipitation, especially in the winter.

The principal streams of the area are the Genesee, the Oswego, formed by the union of Seneca and Oneida rivers, which drain the chain of lakes in central New York, Salmon, and Black rivers.

GENESEE RIVER DRAINAGE BASIN.

DESCRIPTION.

Genesee River rises in Potter County, Pa., 8 or 10 miles south of the New York-Pennsylvania boundary, flows northwestward for about 32 miles, then turns to the northeast and empties into Lake Ontario, 7 miles north of Rochester. Its entire length, following bends, is about 135 miles, and its drainage area comprises about 2,450 square miles.

In the northern portion of this basin the topography is rolling, with long easy slopes, except along the streams, most of which flow in deep ravines, hemmed in by steep banks. There is a gradual rise in a general way through the lakes and in the upper half of the basin the country becomes rough and is broken by ridges; the summits of which attain elevations of from 2,000 to 2,500 feet above the tide.

The mean annual precipitation in the Genesee basin is about 34 inches, ranging from 30 inches in the lower part of the basin to 42 inches in the higher altitudes in the southern part. The winters are rather less severe than in the westerly or northerly parts of New York State, although the rivers are generally frozen over for varying periods of time.

The series of remarkable lakes tributary to the Oswego basin is continued westward into the basin of the Genesee and includes Conesus, Hemlock, Canadice, and Honeoye. These lakes form natural reservoirs and have inlets draining considerable areas at their upper ends. The slopes adjacent to the lakes themselves are narrow and steep and are drained by gulleys and torrential brooks. Below the lakes the area is rolling and the soil rich and extensively cultivated. The areas and elevations of these lakes are shown in the following table:

Areas and elevations of lakes in the Genesee River basin.[a]

Lake.	Elevation.	Water-surface area.	Drainage area.
	Feet.	*Sq. miles.*	*Sq. miles.*
Hemlock Lake	896	2.8	46.8
Canadice Lake	1,092	.7	12.6
Honeoye Lake	800	2.5	39.6

[a] These lake basins are shown on the Honeoye, Canandaigua, Naples, and Wayland topographic atlas sheets of the United States Geological Survey, from which the areas have been taken, with the exception of those for Hemlock and Canadice lakes, which are from surveys of Rochester waterworks.

There are other excellent possibilities for storage in the Genesee basin and extensive surveys and studies have been made by the state water supply commission, which has suggested a dam at Portage, furnishing a storage capacity of 11,000,000,000 cubic feet, this to be utilized also for power development affording some 30,000 horsepower. Such a reservoir would do much to control the floods upon the Genesee, which under the present conditions periodically cause much damage.

In the 39 miles between Belmont, in central Allegany County, and Portage the river falls 253 feet. At Portage there is a total fall of about 300 feet, made up in three portions, and thence nearly to Mount Morris the river flows at the bottom of a deep gorge. From Mount Morris to Rochester the valley is broad and open and the stream is bordered by meadows which are subject to overflow. At Rochester there is another abrupt descent in three heavy falls, amounting to about 360 feet within the city, most of which has been developed.

The State has maintained a dam above Rochester for diverting water to the Erie Canal, and in the basin of Black Creek, one of the upper tributaries of the Genesee from the west, are two reservoirs owned by the State, also used for the benefit of the Erie Canal.

Cuba Reservoir, on the Genesee-Allegheny divide, receives a drainage from a tributary area of 26.6 square miles, having a storage volume of 454,000,000 cubic feet. The overflow from this reservoir enters Allegheny River, but the storage water may be turned into the summit of the abandoned Genesee Valley Canal and thence into Genesee River.

In the improved barge canal, now under construction, the water supply for this section is to be taken from Lake Erie and it is probable that no diversion for this purpose will be necessary from the Genesee drainage basin.

The following gaging stations have been maintained in this river basin:

Genesee River at St. Helena, N. Y., 1908.
Genesee River at Mount Morris, N. Y., 1903–1908.
Genesee River at Jones Bridge, Mount Morris, N. Y., 1903–1906, 1908.
Genesee River at Rochester, N. Y., 1904–1908.
Hemlock Lake at Hemlock, N. Y., 1894–1902.
Canadice Lake Outlet at Hemlock, N. Y., 1903–1908.
Honeoye Creek at East Rush, N. Y., 1903–1906.

GENESEE RIVER AT ST. HELENA, N. Y.

This station is located at the steel highway bridge over the Genesee River at St. Helena, about 6 miles by river below Genesee Lower Falls, 4 miles from Castile, and 5½ miles from Portageville. It was established August 14, 1908, primarily to determine the low-water discharge of Genesee River at this point. Conditions for obtaining

accurate records of discharge appear to be good, hence the station will be maintained to obtain general statistical and comparative data regarding the run-off conditions in the upper Genesee drainage basin. These data will be of value principally for power development.

The discharge is somewhat affected by ice during the winter period, but it is probable that fairly good records of flow under ice cover can be obtained. The bed of the stream is of coarse gravel with a few rocks, and is fairly permanent, and a fairly good rating curve has been developed. The datum of the chain gage has not been changed since the establishment of the station.

Information in regard to this station is contained in the annual reports of the state water supply commission of New York.

Discharge measurements of Genesee River at St. Helena, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 14	Brett and Allen	142	260	2.42	311
September 11	C. R. Adams	120	193	1.90	132
October 19	do	104	164	1.83	89.2

Daily gage height, in feet, of Genesee River at St. Helena, N. Y., for 1908.

[Observer, Herman Piper.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		2.00	2.00	1.90	1.95	16	2.45	1.80	1.90	2.02	2.08
2		2.00	2.00	1.85	1.95	17	2.65	1.90	1.92	2.25	2.20
3		2.00	1.90	1.88	1.92	18	3.05	1.80	1.88	2.12	2.15
4		1.90	1.90	1.92	2.02	19	2.75	1.75	1.88	2.08	2.25
5		2.00	1.90	1.82	1.98	20	2.45	1.80	1.82	2.18	2.35
6		2.00	1.90	1.85	2.12	21	2.35	1.75	1.82	2.22	2.28
7		2.00	1.90	1.88	1.90	22	2.35	1.75	1.82	2.15	2.22
8		1.90	1.80	1.90	1.95	23	2.25	1.8	1.82	2.15	2.45
9		1.80	1.85	1.82	2.00	24	2.25	1.8	1.80	2.12	2.35
10		1.65	1.80	1.92	2.15	25	2.15	1.8	1.82	2.15	2.25
11		1.90	1.90	1.65	2.12	26	2.15	1.75	1.80	2.08	2.28
12		1.90	1.85	2.15	2.02	27	2.15	1.7	1.82	2.00	2.30
13		1.80	1.85	2.12	2.05	28	2.15	1.7	1.90	2.02	2.30
14	2.40	1.80	1.85	2.18	1.98	29	2.05	1.9	1.82	2.02	2.28
15	2.55	1.85	1.92	2.02	2.05	30	2.05	1.9	1.90	2.02	2.25
						31	2.00		1.88		2.38

NOTE.—It is probable that ice conditions prevailed from December 4–31.

Rating table for Genesee River at St. Helena, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.60	53	2.00	152	2.40	303	2.80	495
1.70	71	2.10	185	2.50	347	2.90	550
1.80	95	2.20	221	2.60	394	3.00	610
1.90	122	2.30	261	2.70	444		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on three discharge measurements made during 1908 and high-water measurements made during 1909, and is fairly well defined.

Monthly discharge of Genesee River at St. Helena, N. Y., for 1908.

[Drainage area, 1,030 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 14-31	640	152	289	0.281	0.19	A.
September	152	62	109	.106	.12	B.
October	152	95	114	.111	.13	B.
November	241	62	160	.155	.17	B.
December	.....	.....	160	.155	.18	C.

NOTE.—Discharge for December estimated on the basis of comparisons with the discharge at High Dam and Jones Bridge.

GENESEE RIVER AT MOUNT MORRIS, N. Y.

This station is located at the dam of the Mount Morris Power Company, Mount Morris, N. Y., and is about 2 miles above Canaseraga Creek. It was established May 22, 1903, to obtain data regarding the flow of the Genesee River. The discharge is divided into two parts—that which runs over the dam and wasteways and that which is used at the mills. The station for obtaining the latter is at the wooden highway bridge crossing the tailrace of the Mount Morris Power Company, about one-eighth mile below the power station.

The dam is of stone masonry, with horizontal crest and ogee cross section, and a clear length of about 255 feet. There are two wasteways, each with a crest 18 feet long and 12 inches wide, closed by stop sills to an elevation of about 2 feet above the main dam; also one wasteway with crest 17 feet long and 6 inches wide, about 3 feet higher in elevation than the main dam. The spillways are separated by masonry piers, aggregating 20 feet in width and reaching an elevation of several feet above the main dam.

Several mills and factories use a portion of the flow, which is diverted through a headrace composed of a section of the old Genesee Valley canal. The amount of this diversion is determined by the station on the tailrace below the mills.

During medium and low water stages the water used by the wheels can be fairly well estimated from the gage readings in the tailrace, but at high water there is backwater effect from Canaseraga Creek, at times affecting gage readings. At such times, however, the quantity used by the wheels is relatively a very small portion of the total flow.

There is some leakage from a wasteway at the head of the canal and seepage through the canal banks which is not included in the estimates of discharge given below. This loss varies from about 6 second-feet at low stages to about 40 second-feet at medium and high stages.

The combined results of discharge over the dam and through the wheels at this gaging station are fairly good at medium and high stages, when considerable water is flowing over the dam, and at very low stages when all the water is used by these wheels. At the ordinary low summer stage results are uncertain owing to the effect of pondage by the dam.

The observer at the dam is John McAstocker; the observer at the tailrace is F. M Goff.

Information regarding this station is contained in the annual reports of the state water supply commission of New York and the state engineer and surveyor, State of New York.

Discharge measurements of tailrace of Mount Morris power plant at Mount Morris, N. Y., in 1905–1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1905.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 30	Covert and Weeks	34	106	2.62	245
March 31	do	34	102	2.35	221
Do	do	33	95	2.11	189
August 24	C. C. Covert	36	85	2.08	158
1906.					
April 23	C. C. Covert	34	82.3	2.15	130
September 15	do	36	90.1	2.15	123
1907.					
March 18 [a]	C. C. Covert	34	97.6	2.40	243
1908.					
May 7	D. M. Wood	36	100	2.23	196
July 22	Adams and Brett	30	67	2.04	144
August 12	Brett and Allen	30	74.4	1.91	150
September 10 [b]	C. R. Adams	29	58.1	1.64	121
October 21	do	29	63.6	1.81	130

[a] Measured from downstream side of bridge. The channel below was considerably obstructed by brush causing more or less backwater.
[b] No flow over the dam. Leakage about 2 second-feet. Waste from canal about 4 second-feet.

Daily discharge, in second-feet, of Genesee River at Mount Morris, N. Y., for 1905–1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.[a]												
1				4,840					274	[b] 187	417	1,500
2				[b] 2,140					274	216	545	1,140
3				2,050					[b] 289	231	572	[b] 2,070
4				1,640					245	245	460	3,320
5				1,970					231	289	[b] 545	1,990
6				2,050					274	274	598	1,660
7				1,880					274	216	1,640	1,430
8				1,480					245	[b] 260	1,120	1,430
9				[b] 1,410					216	216	1,060	1,660
10				1,270					[b] 274	216	872	[b] 1,660
11				1,340					274	202	809	1,220
12				2,050					274	216	[b] 809	955
13				1,720					703	245	783	955
14				1,340					417	375	651	776
15				1,270					417	[b] 417	598	437
16				[b] 1,560					417	318	598	352
17			1,340	1,410					[b] 703	318	598	[b] 437
18			1,590	1,340					545	318	598	395
19			[b] 23,500						460	289	[b] 598	437
20			16,400						375	809	502	544

[a] See note at end of table, next page. [b] Sunday.

Daily discharge, in second-feet, of Genesee River at Mount Morris, N. Y., for 1905–1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1905.												
21	.....	.....	9,850	.....	.....	.....	.....	.....	332	809	502	671
22	.....	.....	8,290	.....	.....	.....	.....	.....	303	[a] 783	417	6,750
23	.....	.....	8,450	.....	.....	.....	.....	.....	274	783	417	3,110
24	.....	.....	13,100	.....	.....	.....	.....	.....	[a] 303	756	375	[a] 2,070
25	.....	.....	14,400	.....	.....	.....	.....	.....	245	703	375	1,360
26	.....	.....	[a] 11,100	.....	.....	.....	.....	.....	245	677	[a] 460	1,080
27	.....	.....	15,200	.....	.....	.....	.....	[a] 245	216	545	502	1,020
28	.....	.....	9,930	.....	.....	.....	.....	216	216	572	417	829
29	.....	.....	7,460	.....	.....	.....	.....	216	216	[a] 502	2,590	4,010
30	.....	.....	5,810	.....	.....	.....	.....	216	202	481	4,110	4,980
31	.....	.....	4,420	.....	.....	.....	.....	274	.....	439	.....	[a] 2,070
1906.												
1	1,770	985	324	[a] 3,890	841	814	[a] 214	259	274	545	1,950	859
2	1,390	806	386	3,020	779	814	306	227	[a] 289	545	1,790	[a] 1,050
3	1,110	552	579	2,610	3,420	[a] 722	315	279	274	439	1,960	868
4	1,460	[a] 467	[a] 1,320	3,100	3,900	656	363	444	245	332	[a] 1,550	552
5	2,640	467	1,740	5,480	1,990	568	489	[a] 445	274	354	1,390	648
6	1,610	510	836	4,250	[a] 1,610	1,680	419	319	274	625	1,120	2,950
7	[a] 1,050	595	833	3,540	1,250	2,270	326	308	260	[a] 4,110	1,030	8,450
8	806	648	789	[a] 2,490	918	985	[a] 227	630	231	2,050	877	2,220
9	648	806	693	2,200	832	710	317	577	[a] 231	1,410	806	[a] 1,640
10	573	859	675	5,530	1,360	[a] 548	315	465	187	1,840	780	1,800
11	753	[a] 985	[a] 530	5,250	1,150	629	306	380	180	1,560	[a] 877	3,590
12	859	859	640	3,560	1,100	559	288	[a] 772	180	1,340	909	1,700
13	753	552	550	2,790	[a] 733	456	247	541	231	1,160	1,100	1,390
14	[a] 701	552	503	2,140	918	422	263	444	245	[a] 1,030	1,140	1,460
15	806	467	510	[a] 3,310	1,080	422	[a] 116	328	260	783	1,110	4,640
16	1,050	467	517	3,330	895	392	248	299	[a] 274	651	1,050	[a] 4,990
17	1,460	467	425	2,500	886	[a] 433	431	279	216	598	931	2,550
18	922	[a] 467	[a] 347	2,080	1,290	692	286	288	216	524	[a] 2,500	1,880
19	1,110	467	372	1,590	1,010	674	277	[a] 199	180	502	4,280	922
20	1,110	382	306	1,370	[a] 697	577	306	940	180	1,480	2,550	868
21	[a] 5,460	510	380	1,200	630	486	315	1,840	216	[a] 2,180	7,010	1,130
22	7,070	806	432	[a] 1,090	577	462	[a] 181	958	303	1,310	4,640	985
23	6,920	806	455	1,220	529	440	274	682	[a] 460	1,270	2,550	[a] 713
24	6,070	701	497	1,090	550	[a] 390	221	895	396	998	1,870	510
25	3,040	[a] 859	[a] 432	1,050	1,080	498	207	691	318	2,220	[a] 1,470	552
26	1,850	859	519	926	761	419	234	[a] 398	274	2,050	1,330	561
27	1,530	648	2,820	823	[a] 644	364	221	474	245	1,380	1,270	648
28	[a] 1,390	467	10,900	753	2,760	355	377	612	216	[a] 1,060	1,550	868
29	1,110	.....	4,290	[a] 539	1,650	362	[a] 267	504	216	1,480	1,400	753
30	985	.....	5,000	726	1,280	306	265	398	[a] 303	1,270	1,050	[a] 665
31	985	.....	8,400	.....	994	.....	279	308	.....	1,720	.....	1,340
1907.[b]												
1	4,280	922	467	1,930	2,120	735	3,470	313	[a] 190	542	267	[a] 745
2	2,270	985	552	1,460	1,950	[a] 1,420	1,940	313	190	415	414	613
3	1,850	[a] 985	[a] 552	1,390	1,560	2,660	1,550	313	190	314	[a] 468	294
4	6,210	859	510	1,170	2,210	1,550	1,120	[a] 177	190	457	838	443
5	4,520	859	552	1,110	[a] 2,620	1,350	868	246	190	1,600	827	477
6	[a] 2,550	753	552	1,250	1,720	3,070	657	255	190	[a] 796	710	510
7	3,040	648	467	[a] 1,050	1,490	2,050	[a] 595	255	190	585	1,470	516
8	9,410	753	467	922	2,300	1,340	570	248	[a] 190	1,040	3,260	[a] 607
9	7,800	753	467	985	2,060	[a] 936	1,060	216	227	2,540	2,200	571
10	3,690	[a] 859	[a] 467	1,050	1,640	893	771	209	256	1,100	[a] 1,620	1,360
11	2,640	753	467	1,110	1,420	787	666	[a] 97	314	743	1,190	4,350
12	2,190	648	467	1,460	[a] 1,270	682	3,160	224	415	743	1,070	2,180
13	[a] 2,190	648	753	1,850	1,200	682	3,070	226	314	[a] 849	885	1,420
14	1,770	648	1,850	[a] 1,690	1,070	674	[a] 1,280	226	256	638	775	849
15	3,460	753	6,070	1,460	877	674	877	218	[a] 285	585	719	[a] 902
16	1,850	753	5,130	1,390	1,080	[a] 477	657	218	205	585	566	1,220
17	1,110	[a] 753	[a] 6,780	1,460	1,200	578	570	209	190	457	[a] 604	1,030
18	1,050	648	6,920	1,390	956	493	519	[a] 82	190	415	525	914
19	1,530	648	4,890	1,250	[a] 694	485	476	209	205	415	531	867
20	[a] 7,070	648	5,660	1,110	893	832	476	226	256	[a] 372	578	565

[a] Sunday. [b] See note at end of table, next page.

NOTE.—March 17–31, 1905, tailrace discharge assumed 220 second-feet; April 1–18, 1905, 150 second-feet; August 27–November 30, 1905, 150 second-feet; December 1–31, 1905, 170 second-feet.

January and February, 1906, tailrace discharge assumed 200 second-feet; September and October, 1906, 150 second-feet. During the remainder of 1906 discharge through the tailrace based on daily gage heights and discharge measurements.

Daily discharge, in second feet, of Genesee River at Mount Morris, N. Y., for 1905–1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
21	4,400	648	3,460	[a]1,050	885	528	[a]349	218	227	372	581	750
22	1,850	552	3,690	859	779	570	362	209	[a]227	372	584	[a]796
23	1,250	467	7,360	859	779	[a]1,350	443	218	205	415	587	1,220
24	985	[a]552	[a]4,890	8,270	674	2,050	443	218	190	415	[a]590	13,200
25	859	510	3,460	4,760	674	1,720	443	[a]82	190	415	508	5,450
26	1,250	467	2,640	6,350	[a]993	1,880	371	218	190	343	510	3,310
27	[a]985	510	4,760	6,920	1,590	1,190	400	209	190	[a]415	485	2,600
28	985	510	7,360	[a]3,690	2,050	948	[a]398	209	190	343	545	10,100
29	985	.....	5,010	2,550	2,750	771	371	226	[a]190	542	763	[a]6,820
30	985	.....	3,460	2,100	931	[a]810	342	209	585	585	780	3,620
31	859	.....	2,550	.....	815	.....	313	209	.....	500	.....	5,050
1908.												
1	2,520	618	[a]829	2,710	1,660	3,110	437	346	177	193	[a]111	201
2	1,990	[a]522	1,500	3,320	3,550	1,990	437	[a]474	193	177	185	185
3	1,660	437	2,900	2,800	[a]4,980	1,360	352	346	209	193	170	201
4	1,510	522	2,330	1,820	3,320	1,080	1,660	288	193	[a]111	185	185
5	[a]1,080	522	1,990	[a]1,820	2,520	955	[a]1,080	288	193	226	201	185
6	723	829	1,990	2,330	1,820	829	618	431	[a]153	193	185	[a]99
7	829	776	2,520	1,820	2,520	[a]723	522	431	193	177	170	201
8	829	723	[a]2,710	1,580	6,320	723	437	346	209	162	[a]111	201
9	829	[a]829	1,990	4,490	6,040	618	352	[a]516	201	162	185	201
10	678	829	1,990	2,330	[a]6,890	618	294	431	193	162	185	185
11	678	892	2,160	2,160	3,550	671	352	288	185	[a]99	201	201
12	[a]1,020	829	5,230	[a]1,660	2,520	522	[a]352	266	209	142	201	201
13	3,110	1,220	9,710	1,360	1,820	437	236	344	[a]135	148	215	[a]99
14	2,160	1,500	12,500	1,220	2,520	[a]522	294	308	177	148	185	201
15	1,500	23,000	[a]14,400	1,140	4,490	6,890	352	330	162	148	[a]247	231
16	1,360	[a]13,600	11,100	2,160	3,780	1,820	294	[a]209	193	148	185	233
17	829	5,760	4,730	2,160	[a]2,900	1,220	294	437	162	135	267	251
18	829	3,110	3,550	1,220	1,990	723	1,020	715	177	[a]129	231	267
19	[a]829	2,520	4,730	[a]5,230	1,500	618	[a]1,990	529	177	177	231	300
20	618	2,330	3,110	4,490	1,500	723	829	425	[a]111	193	251	[a]317
21	723	1,220	2,160	3,110	2,710	[a]723	1,080	323	162	148	325	296
22	955	1,360	[a]2,330	2,240	2,160	618	4,370	294	162	155	[a]305	284
23	1,660	[a]1,220	3,110	1,580	1,660	522	1,500	[a]281	162	162	251	201
24	829	1,080	4,250	1,430	[a]1,080	5,230	955	350	148	162	251	185
25	565	955	4,010	1,360	1,080	1,660	6,320	257	148	[a]111	267	94
26	[a]618	1,220	3,320	[a]1,360	955	1,220	[a]1,990	236	142	155	267	325
27	829	1,080	5,760	1,140	4,490	723	1,080	214	[a]99	142	200	[a]317
28	723	723	7,770	1,020	2,330	[a]829	829	192	177	185	201	325
29	671	723	[a]7,770	829	1,360	437	618	215	193	185	[a]111	279
30	565	.....	4,490	892	3,780	437	522	[a]259	193	170	201	296
31	565	.....	3,110	.....	[a]3,780	.....	480	248	.....	185	.....	367

[a] Sunday.

NOTE.—January to April, 1907, tailrace discharge assumed 200 second-feet; September to October, 1907, 190 second-feet. During the remainder of 1907 daily discharge through the tailrace based on daily gage heights and discharge measurements.

January to July, 1908, tailrace discharge assumed 170 second-feet; August 1 to 11, 1908, 164 second-feet. After August 11, 1908, discharge through the tailrace determined from daily gage heights and discharge measurements.

Monthly discharge of Genesee River at Mount Morris, N. Y., for 1905–1908.

[Drainage area, 1,070 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1905.					
March 17–31	23,500	1,340	10,100	9.44	5.27
April 1–18	4,840	1,270	1,820	1.70	1.14
August 27–31	274	216	233	.218	.04
September	703	202	324	.303	.34
October	809	187	416	.389	.45
November	4,110	375	818	.764	.85
December	6,750	352	1,690	1.58	1.82
1906.					
January	7,070	573	1,900	1.78	2.05
February	985	382	643	.601	.63
March	10,900	306	1,520	1.42	1.64
April	5,530	539	2,450	2.29	2.56
May	3,900	529	1,230	1.15	1.33
June	2,270	306	637	.595	.66
July	489	116	287	.268	.31
August	1,840	199	522	.488	.56
September	460	180	255	.238	.27
October	4,110	332	1,250	1.17	1.35
November	7,010	780	1,790	1.67	1.86
December	8,450	510	1,730	1.62	1.87
The year	10,900	116	1,180	1.11	15.09
1907.					
January	9,410	859	2,770	2.59	2.99
February	985	467	696	.650	.68
March	7,360	467	2,990	2.79	3.22
April	8,270	859	2,130	1.99	2.22
May	2,750	674	1,400	1.31	1.51
June	3,070	477	1,140	1.07	1.19
July	3,470	313	922	.862	.99
August	313	82	216	.202	.23
September	585	190	234	.219	.24
October	2,540	314	642	.600	.69
November	3,260	267	848	.793	.88
December	13,200	294	2,370	2.21	2.55
The year	13,200	82	1,360	1.27	17.39
1908.					
January	3,110	565	1,110	1.04	1.20
February	23,000	437	2,450	2.29	2.47
March	14,400	829	4,520	4.22	4.86
April	5,230	829	2,090	1.95	2.18
May	6,890	955	2,950	2.76	3.18
June	6,890	437	1,280	1.20	1.34
July	6,320	236	1,030	.963	1.11
August	715	192	342	.319	.37
September	209	99	173	.162	.18
October	226	99	161	.150	.17
November	325	111	209	.195	.22
December	367	94	230	.215	.25
The year	23,000	94	1,380	1.29	17.53

NOTE.—Discharge 1905–1908 determined by adding the flow over the dam to the flow through the tailrace. Discharge through the waterway near the head of the canal has been disregarded.

Results 1905–1908 are considered to be fairly good for medium and high stages; at low stages estimates may be affected by insufficient gage readings to take account of pondage. At very low stages, where practically all the water flows through the tailrace, estimates are good where based upon gage heights and occasional discharge measurements.

For 1908, where available, the estimates at the Jones Bridge and St. Helena stations are considered to be more reliable than those at this station.

GENESEE RIVER AT JONES BRIDGE, NEAR MOUNT MORRIS, N. Y.

This station is located at the highway bridge across Genesee River, known as Jones Bridge, a short distance below the junction of Canaseraga Creek, and is about 5 miles below Mount Morris. It was

established May 22, 1903, discontinued April 30, 1906, and reestablished August 12, 1908. It is maintained to obtain comparative data regarding the discharge of Genesee River and as a check on the discharge records obtained at High Dam, at Mount Morris.

Conditions of flow are subject to change. Both banks are high, but the left bank is flooded during extreme high water. The records are affected by ice during the winter period. The datum of the chain gage has not been changed since its establishment.

Information in regard to this station is contained in the annual reports of the state water supply commission of New York and the state engineer and surveyor, State of New York.

Discharge measurements of Genesee River at Jones Bridge, near Mount Morris, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 12	Brett and Allen	84	251	4.68	563
September 10	C. R. Adams	71	184	3.80	232
October 21	do	67	164	3.53	156

Daily gage height, in feet, of Genesee River at Jones Bridge, near Mount Morris, N. Y., for 1908.

[Observer, Elizabeth B. Trewer.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		3.8	3.65	3.1	3.8	16	4.35	3.65	3.55	3.65	3.9
2		3.85	3.65	3.45	3.9	17	4.75	3.4	3.55	3.75	3.9
3		3.6	3.6	3.5	3.75	18	5.6	3.75	3.15	3.85	4.05
4			2.95	3.5	3.5	19	5.15	3.45	3.55	3.85	4.15
5			3.6	3.45	3.55	20	4.75	3.1	3.6	3.95	4.1
6			3.6	3.6	3.3	21	4.55	3.5	3.4	4.15	4.1
7		3.7	3.5	3.55	3.55	22	4.25	3.55	3.45	4.05	4.1
8		3.8	3.45	3.5	3.65	23	4.2	3.55	3.5	3.9	4.75
9		3.6	3.55	3.5	3.7	24	4.3	3.55	3.4	3.9	4.75
10		3.55	3.6	3.65	3.8	25	4.3	3.5	3.3	3.9	4.5
11	4.55	3.6	3.2	3.75	3.6	26	4.1	3.45	3.5	3.85	4.25
12	4.65	3.65	3.65	3.65	3.55	27	4.0	3.05	3.6	3.85	4.05
13	4.6	3.25	3.6	4.0	3.35	28	4.05	3.55	3.5	3.8	4.1
14	4.6	3.7	3.6	4.0	3.6	29	3.95	3.65	3.55	3.6	4.1
15	4.45	3.7	3.5	3.75	3.7	30	3.75	3.7	3.55	3.7	4.0
						31	3.85		3.55		4.2

NOTE.—The discharge was probably more or less affected by ice conditions December 15 to 31.

Rating table for Genesee River at Jones Bridge, near Mount Morris, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.90	35	3.60	175	4.30	410	5.00	710
3.00	45	3.70	205	4.40	450	5.10	760
3.10	60	3.80	235	4.50	490	5.20	810
3.20	80	3.90	265	4.60	530	5.30	860
3.30	100	4.00	300	4.70	575	5.40	910
3.40	125	4.10	335	4.80	620	5.50	960
3.50	150	4.20	370	4.90	665	5.60	1,010

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on three discharge measurements made during 1908 and is well defined between gage heights 3.5 feet and 4.7 feet.

Monthly discharge of Genesee River at Jones Bridge, near Mount Morris, N. Y., for 1908.

[Drainage area, 1,410 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 11-31	1,010	220	467	0.331	0.26	A.
September	250	52	171	.121	.14	A.
October	190	40	151	.107	.12	A.
November	352	60	216	.153	.17	A.
December			230	.163	.19	B.

NOTE.—Discharge December 15 to 31, estimated, 270 second-feet on the basis of the discharge at High Dam and St. Helena. Discharge September 4-6, interpolated.

GENESEE RIVER AT ROCHESTER, N. Y.

This station is on the Elmwood avenue steel highway bridge in the city of Rochester, N. Y. It was established February 9, 1904, to determine the total flow of Genesee River. The record up to October 4, 1908, was furnished by the city engineer and board of park commissioners of the city of Rochester, N. Y. Discharge measurements were made and rating curve developed by the United States Geological Survey.

The elevation of zero of gage is 506.848 Barge Canal datum, and 245.591 feet Rochester City datum. The gage datum has remained the same since starting of record. The rating curve is fairly well developed for all stages, and open-water estimates are considered fair except for extreme low water. During a portion of the winter estimates are affected by ice.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Genesee River at Rochester, N. Y., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 18	C. C. Covert	383	2,820	6.02	11,100
1908.					
August 11	Brett and Adams	341	1,130	1.30	670

Daily gage height, in feet, of Genesee River at Rochester, N. Y., for 1907 and 1908.

[Observer, W. Moran.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	4.6	3.0	1.8	3.5	3.6	2.0	2.5	1.2	0.9	1.1	1.3	1.9
2	5.0	2.7	2.0	3.1	3.5	1.9	3.6	1.2	.9	1.4	1.2	1.9
3	3.9	4.7	2.9	2.8	3.2	2.0	2.7	1.3	.9	1.3	1.2	1.8
4	4.9	4.8	2.8	2.6	3.0	3.1	2.4	1.2	.9	1.3	1.2	1.7
5	6.7	4.5	2.5	2.5	4.2	2.5	1.9	1.1	.9	1.3	1.7	1.7
6	5.4	4.3	2.1	2.5	4.0	2.3	1.8	1.1	.9	2.3	1.7	1.6
7	4.4	4.1	2.2	2.4	3.2	3.5	1.7	1.1	.9	1.9	1.9	1.6
8	5.1	3.9	2.0	2.3	3.0	2.9	1.5	1.0	.9	1.7	2.5	1.6
9	7.0	3.7	1.8	2.3	3.5	2.3	1.4	1.0	.9	2.3	4.0	1.5
10	6.5	3.5	1.7	2.3	3.1	2.0	1.3	1.0	.9	2.9	3.3	1.5
11	4.8	3.3	1.6	2.4	2.9	1.9	1.2	1.0	1.0	2.2	3.0	2.6
12	3.9	3.1	1.5	2.7	2.7	1.8	1.1	1.0	1.1	1.9	2.6	3.8
13	3.5	3.1	1.8	3.1	2.6	1.7	3.1	1.0	1.1	1.9	2.3	2.9
14	3.3	2.9	3.0	3.3	2.4	1.6	3.0	1.0	1.15	1.8	2.0	2.5
15	3.7	2.7	4.7	3.1	2.1	1.5	2.2	1.0	1.1	1.8	2.0	2.4
16	3.8	2.7	6.8	3.0	2.2	1.5	1.8	.95	1.0	1.7	1.8	2.3
17	2.8	2.6	5.7	2.9	2.4	1.5	1.6	.95	1.0	1.5	1.6	2.5
18	2.7	2.4	6.0	2.8	2.4	1.5	1.5	.9	1.0	1.4	1.6	3.0
19	2.7	2.4	6.0	2.7	2.3	1.5	1.4	.9	1.0	1.3	1.6	2.7
20	4.4	2.3	5.1	2.5	2.1	1.5	1.3	.9	.95	1.2	1.6	2.3
21	4.8	2.4	5.2	2.4	2.2	2.0	1.3	.9	.95	1.2	1.6	2.2
22	4.3	2.4	4.8	2.3	2.0	1.8	1.5	.9	.95	1.2	1.6	2.3
23	3.2	2.5	4.7	2.1	1.9	2.0	1.6	.9	.95	1.3	1.4	2.0
24	2.8	2.4	5.8	2.7	1.9	2.5	2.0	.9	1.0	1.2	1.6	5.5
25	2.6	2.3	5.1	6.55	1.8	2.7	1.6	.95	1.0	1.2	1.6	7.9
26	3.1	1.9	4.3	5.1	1.8	2.7	1.4	.9	1.0	1.2	1.6	7.3
27	3.8	1.8	3.9	6.1	1.8	2.5	1.6	.9	.9	1.2	1.6	5.3
28	3.5	1.8	5.3	5.9	2.6	2.2	1.5	.9	.9	1.1	1.7	5.6
29	3.4	.....	6.1	4.5	2.8	2.0	1.3	.9	.9	1.2	1.8	7.2
30	3.1	.....	5.2	3.8	2.5	1.9	1.2	.9	1.0	1.3	2.0	7.0
31	3.0	.....	4.0	.....	2.2	.....	1.2	.9	.....	1.5	.....	5.7
1908.												
1	5.3	2.9	2.4	4.1	2.3	3.6	1.6	1.5	1.2	1.0	.....	.....
2	5.0	2.6	2.3	3.7	4.0	3.4	1.6	1.4	1.2	1.0	.....	.....
3	3.4	2.6	2.9	3.7	5.2	2.9	1.5	1.3	1.2	1.0	.....	.....
4	3.0	2.5	3.7	3.5	5.3	2.4	1.6	1.3	1.2	1.0	.....	.....
5	2.8	2.5	3.9	3.1	4.6	2.1	1.9	1.3	1.3	.....	.....	.....
6	2.6	2.4	3.4	3.0	3.8	2.0	2.2	1.3	1.2	.....	.....	.....
7	2.6	2.5	4.6	3.1	3.3	1.9	2.0	1.2	1.2	.....	.....	.....
8	2.4	2.6	5.0	3.0	4.6	1.9	1.8	1.4	1.1	.....	.....	.....
9	2.3	2.6	4.5	3.0	6.2	1.8	1.8	1.3	1.1	.....	.....	.....
10	2.1	2.6	4.0	3.7	6.5	1.6	1.5	1.3	1.1	.....	.....	.....
11	2.3	2.6	3.4	3.3	6.5	1.4	1.4	1.3	1.1	.....	.....	.....
12	2.1	2.6	4.7	3.0	5.4	1.4	1.3	1.3	1.1	.....	.....	.....
13	2.4	2.7	5.9	3.0	4.2	1.4	1.3	1.3	1.1	.....	.....	.....
14	3.7	5.6	7.6	2.9	3.6	1.4	1.3	1.3	1.0	.....	.....	.....
15	3.8	5.4	8.2	2.7	4.0	1.6	1.4	1.4	1.0	.....	.....	.....
16	3.0	7.4	8.7	2.4	5.1	6.6	1.4	1.4	1.0	.....	.....	.....
17	3.0	8.5	9.1	2.7	4.7	4.4	1.4	1.4	1.0	.....	.....	.....
18	2.8	8.9	8.6	2.8	4.2	2.9	1.8	1.4	1.0	.....	.....	.....
19	2.9	7.8	7.5	2.6	3.6	2.1	2.4	1.8	1.0	.....	.....	.....
20	3.0	5.3	5.1	4.3	3.1	2.0	2.8	1.8	1.0	.....	.....	.....
21	2.1	4.5	4.5	5.5	3.0	1.9	2.1	1.6	1.0	.....	.....	.....
22	2.3	3.9	3.7	4.5	3.4	1.8	2.5	1.5	1.0	.....	.....	.....
23	2.8	3.4	3.7	3.6	3.0	2.0	4.0	1.4	1.0	.....	.....	.....
24	3.1	2.9	4.1	3.1	3.0	3.6	3.0	1.3	1.0	.....	.....	.....
25	4.1	2.8	4.6	2.9	2.8	2.3	2.3	1.3	1.0	.....	.....	.....
26	3.8	2.5	4.5	2.7	2.5	2.1	3.0	1.2	1.0	.....	.....	.....
27	3.6	2.7	4.1	2.7	2.2	2.0	3.1	1.2	1.0	.....	.....	.....
28	3.3	2.5	5.3	2.5	3.6	1.9	2.7	1.2	1.0	.....	.....	.....
29	3.7	2.8	6.1	2.3	3.2	1.8	2.4	1.2	1.0	.....	.....	.....
30	3.5	.....	6.0	2.1	3.5	1.6	2.1	1.2	1.0	.....	.....	.....
31	2.6	.....	5.0	.....	3.5	.....	1.8	1.2	.....	.....	.....	.....

NOTE.—The discharge was probably not materially affected by ice conditions during January to March, 1908.

Rating table for Genesee River at Rochester, N. Y., 1903 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	310	2.20	1,960	3.50	4,600	5.40	9,620
1.00	400	2.30	2,140	3.60	4,840	5.60	10,200
1.10	490	2.40	2,320	3.70	5,080	5.80	10,800
1.20	580	2.50	2,500	3.80	5,320	6.00	11,400
1.30	670	2.60	2,700	3.90	5,560	6.20	12,000
1.40	760	2.70	2,900	4.00	5,800	6.40	12,600
1.50	850	2.80	3,100	4.20	6,320	6.60	13,220
1.60	1,000	2.90	3,300	4.40	6,840	6.80	13,860
1.70	1,150	3.00	3,500	4.60	7,380	7.00	14,500
1.80	1,300	3.10	3,720	4.80	7,940	8.00	17,800
1.90	1,450	2.20	3,940	5.00	8,500	9.00	21,400
2.00	1,600	3.30	4,160	5.20	9,060	10.00	25,100
2.10	1,780	3.40	4,380				

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made during 1904–1908, and is well defined.

Monthly discharge of Genesee River at Rochester, N. Y., for 1907 and 1908.

[Drainage area, 2,360 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	15,000	2,700	6,350	2.69	3.10	A.
February	.....	.....	1,500	.636	.66	C.
March	12,900	.....	5,400	2.29	2.64	B.
April	13,100	1,780	4,210	1.78	1.99	B.
May	6,320	1,300	2,870	1.22	1.41	B.
June	4,600	850	1,850	.784	.87	B.
July	4,840	490	1,420	.602	.69	B.
August	670	310	393	.167	.19	C.
September	535	310	368	.156	.17	C.
October	3,300	490	1,020	.432	.50	B.
November	5,800	580	1,540	.653	.73	B.
December	17,500	850	4,930	2.09	2.41	B.
The year	17,500	310	2,650	1.12	15.36	
1908.						
January	9,340	1,780	3,790	1.61	1.86	B.
February	21,000	2,320	5,940	2.52	2.72	A.
March	21,800	2,140	9,080	3.85	4.44	A.
April	9,910	1,780	4,000	1.69	1.89	B.
May	12,900	1,960	6,020	2.55	2.94	A.
June	13,200	760	2,420	1.03	1.15	B.
July	5,800	670	1,780	.754	.87	B.
August	1,300	580	733	.311	.36	B.
September	.....	.....	280	.119	.13	C.
October	.....	.....	260	.110	.13	C.
November	.....	.....	350	.148	.17	C.
December	.....	.....	380	.161	.19	C.
The year	21,800	.....	2,920	1.24	16.85	

NOTE.—Discharge February 1 to March 15, 1907, estimated by the United States Geological Survey by comparison with the discharge at High Dam.

Discharge September to December, 1908, based on a study and intercomparison of the discharge at the three upper stations on this river. These results agree closely with discharge obtained for Genesee River at St. Helena and Jones Bridge. These latter records are considered much more reliable than those at High Dam. The discharge at Rochester as obtained by the rating table for September to December, 1908, was believed to be too high and hence was reduced in accordance with the above.

CANADICE LAKE OUTLET AT HEMLOCK, N. Y.

Canadice Lake is tributary to Genesee River through Hemlock Lake outlet and Honeoye Creek. Hemlock Lake is used as a source of water supply for the city of Rochester. The gaging station was

established at the outlet at the foot of the lake by the city engineers' department of Rochester in February, 1903.

A standard thin-edged weir with a 5-foot crest and two end contractions is so arranged with needle timbers at the ends that during high water the length may be increased to 14.96 feet with no end contractions. The weir crest stands 3 feet above the stream channel and is never submerged by backwater. There are two additional rectangular gates, each 1 foot square, with three complete contractions and a fourth partial contraction at the bottom. The outflow from the lake above the weir is controlled by gates.

A reading of the depth on the weir is taken each morning and also for each change of the gates, the depth being read to hundredths and corrections being made for velocity of approach for the larger discharges. The discharge is calculated by the Francis formula. The record has been furnished by E. A. Fisher, city engineer, and John F. Skinner, principal assistant city engineer, of Rochester, N. Y.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York, and the city engineer of Rochester.

Monthly discharge of Canadice Lake Outlet, Hemlock, N. Y., for 1907 and 1908.

[Drainage area, 12.6 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Mean elevation of lake above low water, in feet.	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Mean elevation of lake above low water, in feet.
	Mean.	Per square mile.				Mean.	Per square mile.		
1907.					1908.				
January	27.56	2.19	2.52	.....	January	26.4	2.10	2.42	2.042
February	13.06	1.04	1.08	.....	February	23.2	1.84	1.98	1.658
March	17.26	1.37	1.58	.....	March	33.6	2.67	3.08	2.143
April	21.37	1.70	1.90	.....	April	16.5	1.31	1.46	2.146
May	11.18	.888	1.02	.....	May	32.0	2.54	2.93	1.893
June	7.66	.608	.681	.....	June	10.2	.810	.90	2.479
July	7.63	.606	.697	.....	July	11.2	.889	1.02	2.213
August	5.90	.468	.538	.....	August	8.6	.683	.79	1.448
September	4.40	.349	.391	.....	September	4.3	.341	.38	.718
October	3.44	.273	.314	.....	October	2.9	.230	.27	.155
November	6.20	.492	.551	.....	November	4.0	.317	.35	−.345
December	17.02	1.35	1.55	.....	December	3.7	.294	.34	−.841
The year	11.89	.944	12.82	.....	The year	14.7	1.17	15.92	1.309

OSWEGO RIVER DRAINAGE BASIN.

DESCRIPTION.

Oswego River is formed by the union of Seneca and Oneida rivers about 25 miles northwest of Syracuse; whence its course is northwestward to Oswego, where it enters Lake Ontario. The length of the river from the junction to the mouth is about 20.5 miles, and the drainage basin in this district is a narrow strip of moderately rolling country. Above the junction of Seneca and Oneida rivers the basin spreads out, attaining a total width east and west of about 100 miles

and north and south of about 80 miles. The total drainage area is about 5,000 square miles.

There is on the whole a gradual rise from the low, level lands, which border Lake Ontario, to the north-south ridges which separate the various lakes south of Seneca River and which farther south become merged with the still more elevated country lying along the southern boundary of the Lake Ontario drainage basin.

The most remarkable feature of the drainage basin is the chain of lakes stretching across its southern border. From west to east the principal lakes are, in order, Canandaigua, Keuka, Seneca, Cayuga, Owasco, Skaneateles, and Oneida. These seven lakes include a water surface of approximately 280 square miles, increased by four smaller lakes—Cross, Onondaga, Otisco, and Cazenovia—to about 295 square miles. The larger of the lakes—Oneida, Cayuga, and Seneca—are used for steam-towing navigation, having connection with the Erie and Oswego canals. Cayuga and Seneca lakes are noted for their depth and for the abrupt slopes of their beds. The influence of the lakes on Oswego River is of the utmost importance in contributing to the steadiness of its flow.

A fall of 100 feet in the course of the main river is largely utilized by seven dams, which also partly canalize the stream (Pl. VII, *A*). The intervening stretches are covered by the Oswego Canal, which draws its water supply from the river.

The mean annual precipitation in this basin is about 35 inches, and the winters are rather less severe than farther east and north in the State.

The Oswego and its tributaries are of importance in connection with the new barge canal. The Oswego itself is to be canalized and serve as a connection from the main canal at Three Rivers to Lake Ontario. The route of the main canal passes through Oneida Lake down Oneida River to its junction with Seneca River at Three River Point, thence up Seneca River in its general westward course. The water supply for the Oswego River section will be furnished from this drainage.

The following gaging stations have been maintained in this river basin:

Seneca Lake at Geneva, N. Y., 1905–6.
Seneca River at Baldwinsville, N. Y., 1898–1908.
Oswego River above Minetto, N. Y., 1900–1903.
Oswego River at Battle Island, N. Y., 1900–1906.
Oswego River at Oswego, N. Y., 1897–1901.
Fall Creek near Ithaca, N. Y., 1908.
Cayuga Lake at Ithaca, N. Y., 1905–1908.
Skaneateles Lake at Skaneateles, N. Y., 1890–91.
Skaneateles Lake outlet at Willow Glen, N. Y., 1892–1908.
Skaneateles Lake outlet at Jordan, N. Y., 1890–1892.
Onondaga Lake outlet at Long Branch, N. Y., 1904.
East Branch of Fish Creek at Point Rock, N. Y., 1898–99.

West Branch of Fish Creek at McConnellsville, N. Y., 1898–1901.
Oneida River at Brewerton, N. Y., 1899.
Oneida River at Euclid, N. Y., 1902–1908.
Oneida Creek at Kenwood, N. Y., 1898–1900.
Chittenango Creek at Chittenango, N. Y., 1901–1906.
Chittenango Creek at Bridgeport, N. Y., 1898–1901.

FALL CREEK NEAR ITHACA, N. Y.

This station is located at the steel highway bridge about 1¼ miles north of the city of Ithaca and about one-half mile below the Cornell University hydraulic laboratory. It was established July 7, 1908, to obtain general statistical and comparative data regarding the total flow of Fall Creek.

The gage heights are somewhat affected by ice during the winter and may at times be slightly affected by backwater from Cayuga Lake, about 800 feet downstream and 4 or 5 feet lower in elevation.

The following wading measurement was made October 23, 1908: Width, 26.5 feet; area, 13.4 square feet; gage height, 0.34 foot; discharge, 22 second-feet.

Daily gage height, in feet, of Fall Creek near Ithaca, N. Y., for 1908.

[Observer, John J. Nolan.]

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	0.42	0.26	0.35	0.35	0.40	16	0.68	0.40	0.25	0.31	0.48	0.32
2	.....	.42	.26	.30	.26	.40	17	.61	.34	.20	.30	.51	.32
3	.....	.42	.21	.26	.30	.42	18	.58	.38	.15	.28	.48	.42
4	.....	.45	.26	.12	.38	.45	19	.60	.32	.16	.25	.51	.52
5	.....	.41	.28	.28	.32	.36	20	.58	.32	.12	.28	.46	4.00
6	.....	.42	.25	.25	.36	.72	21	.60	.32	.14	.28	.52	5.55
7	.....	.50	.25	.28	.30	.58	22	1.52	.42	.18	.28	.38	6.75
8	.....	.52	.25	.32	.28	.43	23	.95	.38	.10	.15	.40	9.25
9	.....	.45	.25	.25	.45	.45	24	.75	.32	.00	.12	.41	12.00
10	.....	.40	.28	.15	.50	.70	25	.90	.32	.02	.12	.42	10.75
11	.....	.35	.25	.28	.51	.11	26	.80	.28	.00	.22	.40	9.90
12	0.52	.38	.25	.28	.50	.25	27	.75	.30	.11	.25	.42	10.00
13	.82	.39	.25	.30	.41	.40	28	.68	.28	.20	.35	.34	10.00
14	.70	.38	.32	.25	.42	.32	29	.56	.28	.35	.35	.30	6.55
15	.64	.78	.25	.28	.35	.40	30	.54	.26	.28	.35	.32	5.05
							31	.45	.28	.....	.35	.....	4.15

NOTE.—Ice conditions prevailed during December.

CAYUGA LAKE AT ITHACA, N. Y.

This station is located at the breakwater about 150 feet from the light-house at the south end of Cayuga Lake, near Ithaca, N. Y. It was established August 6, 1905. The station has been maintained to obtain records of fluctuations in the level of Cayuga Lake.

The datum of the staff gage has remained the same during the maintenance of the station. Readings are subject to occasional slight error when the water is rough.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

A. STATE DAM ON OSWEGO RIVER AT OSWEGO, N. Y.

B. FALL ON MOOSE RIVER ABOVE LYONSDALE, N. Y.

Daily gage height, in feet, of Cayuga Lake at Ithaca, N. Y., for 1907 and 1908.

[Observer, Fred Thomas.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1						1.4						
2		2.35	1.0								0.55	
3								1.1				
4					1.95							
5	2.5									0.95		
6				1.5			1.15					
7									1.5			0.35
8						1.15						
9		1.8	.75								.9	
10								1.5				
11					2.0							
12	2.8									.9		
13				1.45			1.2					.7
14									1.0			
15						.95						
16		1.55	1.05								.85	
17								1.0				
18					1.7							
19	2.5									.85		
20				1.25			1.1					
21									1.0			.75
22						.8						
23		1.5	1.55								.55	1.7
24								.95				
25					1.5							
26	2.6									.65		
27				1.9			1.15					
28									1.5			1.8
29			1.75			.9						
30											.5	
31								.95				
1908.												
1		1.1						1.85				
2					2.5							
3										1.2		
4	1.75			3.1			1.8					
5									1.65			—.4
6						2.4						
7			0.75								0.45	
8		.8						1.9				
9					2.7							
10										1.1		
11	1.6			2.6			1.75					
12									1.5			—.45
13						2.3						
14			2.4								.15	
15		1.3						1.9				
16					3.0							
17										.95		
18	1.5			2.4			1.7					
19									1.55			—.4
20						2.5						
21			3.1								.00	
22		.85						1.75				
23					2.65							
24										.8		
25	1.45			2.3			1.95					
26									1.3			—.6
27						1.95						
28			3.05								—.25	
29		.6			2.6			1.7				
30												
31										.9		

NOTE.—Lake frozen about the gage from about January 19 to about March 20, 1907; also from the early part of December to December 23, 1907, when the ice went out.

Lake frozen about the gage from about January 11 to March 14, 1908, when the ice went out; also probably frozen during part of December, 1908, although no note is available to that effect.

SENECA RIVER AT BALDWINSVILLE, N. Y.

This gaging station was established November 12, 1898, at the state dam in Baldwinsville, 12 miles along the river from the junction of Seneca and Oneida rivers. Beginning with 1907, this station has been maintained by the New York state engineer's department, which has furnished the accompanying records.

The record at this station includes the discharge over the main dam, which is calculated by the formula for a broad, flat-crested weir, when flashboards are removed. The discharge over the flashboards is calculated by the Francis formula. Gage readings in the river channel below the dam are utilized to determine the average working head on the turbines. The discharge through the three main canals is determined from records of the run of water wheels kept in each mill and from the recorded lockage and opening of paddles at the Oswego Canal lock at the foot of the canal. Current-meter measurements to determine the leakage of the several mills have been made during 1905, as in previous years, and allowance for this leakage has been made. The record has also been checked by current-meter measurements made during 1901, 1903, 1904, and 1905 at Belgium.

Owing to the complicated conditions of flow at this station and the uncertainty regarding leakage the results are considered to be only fair in accuracy.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Daily discharge, in second-feet, of Seneca River at Baldwinsville, N. Y., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5,341	4,242	2,712	5,630	5,426	3,842	2,918	2,057	[a] 625	1,959	2,477	[a] 3,114
2	5,742	4,226	2,829	5,507	5,476	[a] 3,039	2,846	2,063	1,245	2,048	2,583	3,610
3	5,775	[a] 3,731	[a] 2,814	5,423	5,326	3,829	2,767	2,054	1,267	2,048	[a] 2,249	3,386
4	6,579	4,285	3,304	5,127	5,171	3,884	1,989	[a] 1,311	1,277	2,121	2,850	3,284
5	6,511	4,242	3,320	5,261	[a] 4,623	3,950	1,597	1,892	1,405	2,127	2,924	3,217
6	[a] 6,346	4,105	3,166	4,736	5,150	3,861	2,634	2,151	1,497	[a] 1,253	2,885	3,163
7	6,820	4,105	3,129	[a] 4,087	5,070	4,132	[a] 2,068	2,205	1,322	2,138	2,164	3,083
8	7,115	4,057	3,033	4,775	4,996	4,003	2,829	1,998	[a] 839	2,128	3,539	[a] 2,404
9	7,143	3,982	3,006	4,667	4,980	[a] 3,160	2,782	1,903	1,426	2,135	4,012	2,976
10	7,143	[a] 3,526	[a] 2,633	4,591	4,779	3,773	2,711	1,893	1,375	2,397	[a] 3,619	2,893
11	7,041	3,924	3,071	4,514	4,942	3,738	2,424	[a] 1,311	1,137	2,595	4,525	3,366
12	7,038	3,507	3,013	4,446	[a] 4,241	3,525	2,643	2,213	1,801	2,675	4,587	3,588
13	[a] 6,282	3,378	3,146	4,388	4,912	3,519	2,628	1,923	1,690	[a] 1,806	4,513	3,588
14	6,864	3,296	3,461	[a] 3,729	4,964	3,432	[a] 1,883	1,714	1,415	2,454	4,267	3,332
15	6,717	3,107	3,855	4,499	4,704	3,365	2,737	1,663	[a] 898	2,458	4,136	[a] 2,712
16	6,623	3,097	4,381	4,454	4,952	[a] 2,695	2,578	1,663	1,671	2,409	4,201	3,291
17	6,358	[a] 3,038	[a] 4,403	4,454	4,775	3,123	2,578	1,511	1,587	2,409	[a] 3,140	3,476
18	6,488	3,352	5,423	4,275	4,742	3,245	2,532	[a] 1,038	1,671	2,377	3,541	3,596
19	5,417	3,351	5,570	4,319	[a] 4,045	3,214	2,418	1,679	1,671	2,376	3,405	3,729
20	[a] 5,337	3,402	5,817	4,010	4,754	2,995	2,284	1,448	1,640	[a] 1,742	3,349	3,690
21	5,565	3,398	5,817	[a] 3,393	4,486	2,850	[a] 1,843	1,247	1,735	2,510	3,294	3,645
22	3,944	3,302	5,870	3,934	4,463	2,913	2,319	1,114	[a] 1,119	2,510	3,251	[a] 3,081
23	3,523	3,007	5,942	3,657	4,255	[a] 2,392	2,353	978	1,990	2,527	3,388	3,746
24	3,164	[a] 2,599	[a] 5,423	3,840	4,143	2,865	2,121	1,000	1,879	2,247	[a] 2,771	4,395
25	2,920	2,801	6,051	4,375	4,076	2,801	2,659	[a] 823	1,784	2,239	3,174	4,597

[a] Sunday.

Daily discharge, in second-feet, of Seneca River at Baldwinsville, N. Y., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
26	4,110	2,588	5,915	4,667	[a]3,416	2,768	2,604	1,196	1,732	2,101	3,184	5,596
27	[a]4,292	2,530	5,825	4,824	4,199	2,671	2,509	1,119	1,610	[a]1,279	3,168	5,880
28	4,187	2,626	5,825	[a]4,432	4,170	2,616	[a]1,794	1,076	1,770	2,596	2,050	6,037
29	4,187	.....	5,826	5,332	4,005	2,673	2,344	983	[a]1,151	2,546	3,519	[a]5,595
30	4,144	.....	5,725	5,355	3,694	[a]3,203	2,212	1,115	1,855	2,585	3,339	6,113
31	4,177	.....	[a]5,134	.....	3,998	.....	2,164	1,065	.....	2,550	.....	6,192
1908.												
1	6,017	2,511	[a]4,196	.....	5,222	4,461	2,412	2,254	1,116	1,605	[a]1,300	1,850
2	6,162	[a]1,804	4,687	.....	5,449	4,288	2,234	[a]1,737	1,058	1,705	1,908	1,761
3	6,001	2,303	4,692	.....	[a]4,424	4,250	2,240	2,273	1,150	1,718	1,801	1,789
4	5,873	2,420	4,684	.....	5,575	4,174	1,846	2,004	1,052	[a]1,346	1,801	1,740
5	[a]5,219	2,848	4,687	.....	5,561	3,852	[a]1,507	2,036	987	1,773	1,798	1,741
6	5,286	2,915	4,684	.....	5,695	4,003	2,741	2,042	[a]653	1,579	1,801	[a]1,450
7	4,783	2,777	5,046	.....	5,441	[a]2,958	2,669	2,044	967	1,582	1,798	1,871
8	4,455	2,791	[a]4,672	5,835	5,678	3,962	2,814	1,881	1,205	1,552	[a]1,502	1,701
9	4,455	[a]2,434	5,177	5,835	5,949	3,943	2,648	[a]1,280	1,179	1,712	2,003	1,693
10	4,332	2,709	5,229	5,828	[a]5,184	3,756	2,585	1,951	1,110	1,787	2,003	1,592
11	5,175	2,891	5,427	5,789	6,078	3,758	2,398	1,851	1,597	[a]1,288	1,978	1,581
12	[a]3,756	2,921	5,937	[a]4,822	6,338	3,568	[a]1,583	1,814	1,648	1,773	1,833	1,554
13	4,470	2,951	6,192	5,310	6,518	3,237	2,333	1,790	[a]1,400	1,659	1,779	[a]1,363
14	4,583	3,105	6,172	5,052	6,262	[a]2,385	2,384	1,793	1,591	1,609	1,779	1,778
15	4,603	4,474	[a]5,788	4,803	6,258	3,876	2,327	1,760	1,501	1,662	[a]1,300	1,637
16	4,541	[a]5,117	6,873	4,797	6,239	4,296	2,182	[a]1,187	1,323	1,678	1,586	1,572
17	5,732	5,586	7,072	5,055	[a]5,184	4,494	2,266	1,837	1,403	1,646	1,509	1,517
18	4,161	5,372	7,188	4,913	6,128	4,472	2,335	1,910	1,390	[a]1,346	1,509	1,339
19	[a]3,573	5,649	7,269	[a]3,944	6,002	4,344	[a]1,933	1,861	1,338	1,799	1,636	1,634
20	4,800	5,632	7,269	4,838	5,872	4,348	2,536	1,748	[a]1,001	1,771	1,580	[a]1,684
21	3,445	5,497	7,217	5,059	5,742	[a]3,772	2,771	1,884	1,312	1,771	1,578	1,925
22	3,588	5,369	[a]6,550	5,459	5,738	3,407	3,001	1,306	1,277	1,741	[a]1,274	1,780
23	3,293	[a]5,007	7,032	5,315	5,460	3,202	3,093	[a]1,109	1,307	1,771	1,638	1,660
24	3,109	5,305	6,892	5,356	[a]4,414	3,212	3,007	1,671	1,380	1,826	1,688	1,381
25	2,965	5,055	6,612	5,325	5,330	2,824	3,061	1,453	1,386	[a]1,374	1,562	633
26	[a]2,193	5,089	6,612	[a]4,314	5,090	2,738	[a]2,333	1,535	1,396	1,934	1,353	1,698
27	2,948	5,029	6,482	5,247	5,037	2,611	3,031	1,537	[a]1,053	1,934	1,608	[a]1,242
28	2,654	4,812	6,188	5,340	4,645	[a]2,291	3,031	1,601	1,473	1,934	1,606	1,772
29	2,470	4,694	[a]5,740	5,090	4,536	2,460	2,875	1,112	1,461	2,035	[a]1,121	1,512
30	2,353	.....	6,168	5,090	4,485	2,684	2,719	[a]526	1,018	1,299	1,407	1,491
31	2,145	.....	6,042	.....	[a]3,971	.....	1,950	1,103	.....	1,284	.....	1,474

[a] Sunday.

Monthly discharge of Seneca River at Baldwinsville, N. Y., for 1907 and 1908.

[Drainage area, 3,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	7,140	2,920	5,580	1.80	2.08
February	4,280	2,530	3,460	1.12	1.17
March	6,050	2,630	4,370	1.41	1.63
April	5,630	3,390	4,560	1.47	1.64
May	5,480	3,420	4,610	1.49	1.72
June	4,130	2,390	3,270	1.05	1.17
July	2,920	1,600	2,410	.777	.90
August	2,210	823	1,530	.494	.57
September	1,990	625	1,470	.474	.53
October	2,680	1,250	2,240	.723	.83
November	4,590	2,050	3,340	1.08	1.20
December	6,190	2,400	3,880	1.25	1.44
The year	7,140	625	3,390	1.09	14.88
1908.					
January	6,160	2,140	4,170	1.35	1.56
February	5,650	1,800	3,970	1.28	1.38
March	7,270	4,200	5,950	1.92	2.21
April	.....	3,940	5,140	1.66	1.42
May	6,520	3,970	5,470	1.76	2.03
June	4,490	2,290	3,590	1.16	1.29
July	3,090	1,510	2,480	.800	.92
August	2,270	526	1,670	.539	.62
September	1,650	653	1,260	.406	.45
October	2,040	1,280	1,660	.535	.62
November	2,000	1,120	1,630	.526	.59
December	1,920	633	1,590	.513	.59
The year	7,270	526	3,220	1.04	13.68

NOTE.—Discharge April 1 to 7, 1908, estimated 5,850 second-feet.

SKANEATELES LAKE OUTLET AT WILLOW GLEN, N. Y.

This station is located in the village of Willow Glen, 1.5 miles below the foot of Skaneateles Lake, and was established March 10, 1895. It has been maintained by the city of Syracuse to obtain data regarding the flow of Skaneateles Creek.

Observation is made of the daily discharge over a thin-edged weir, having a crest length of 27.8 feet, with two end contractions. The discharge is calculated from the observed depth on an iron pin set with its top at crest level, 5.2 feet upstream from the weir, by means of the Francis formula, including corrections for end contractions and velocity of approach.

Since July 1, 1894, the water supply of the city of Syracuse has been drawn from Skaneateles Lake, and the amount of this diversion should be added to the discharge of the outlet to obtain the total run-off of the drainage basin. The calculated diversion, as determined from the record of gate openings and head at the inlet gates, using the orifice formula with a constant coefficient, stated as 0.62, has been furnished by the city of Syracuse.

There are several small water-power developments on Skaneateles Creek, all below the weir, but these do not affect the flow. The gage datum has remained the same during the maintenance of the station. During the winter months the discharge is only slightly affected by the presence of ice. Conditions are good for obtaining accurate discharge, and a very good rating table has been developed.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Skaneateles Lake outlet at Willow Glen, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
June 29[a]	D. M. Wood	24	.....	0.86	72.5
Do	do	24	.....	.86	74.6
May 6	do	27.5	53.1	1.17	138
Do	do	27.5	51.2	1.17	131
August 16	Brett and Allen	28.5	37.6	1.00	91.2

[a] Measurement made at second bridge above weir.

Daily discharge, in second-feet, of Skaneateles Lake outlet at Willow Glen, N. Y., for 1907 and 1908.

[Observer, Edward Couran.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	41.7	48.9	39.4	53.8	25.0	27.0	39.4	39.4	35.0	53.8	53.8	53.8
2	44.1	48.9	39.4	53.8	25.0	27.0	39.4	41.7	58.9	53.8	53.8	51.4
3	48.9	44.1	39.4	53.8	25.0	27.0	39.4	39.4	44.1	53.8	53.8	51.4
4	48.9	41.7	39.4	16.3	25.0	27.0	37.2	39.4	35.0	56.5	53.8	53.8
5	39.4	41.7	39.4	16.3	25.0	27.0	35.0	39.4	35.0	58.9	53.8	53.8
6	58.9	41.7	39.4	16.3	25.0	28.9	35.0	39.4	35.0	58.9	53.8	53.8
7	58.9	39.4	39.4	16.3	23.2	35.0	35.0	39.4	35.0	56.5	64.0	53.8
8	58.9	39.4	39.4	16.3	23.2	30.9	35.0	39.4	35.0	66.5	58.9	53.8
9	48.9	39.4	39.4	16.3	23.2	27.0	35.0	39.4	35.0	58.9	58.9	56.5
10	48.9	39.4	39.4	10.4	25.0	27.0	35.0	39.4	35.0	53.8	56.5	58.9
11	48.9	39.4	39.4	10.4	25.0	27.0	35.0	39.4	35.0	56.5	56.5	61.5
12	48.9	39.4	39.4	7.8	23.2	27.0	35.0	39.4	35.0	56.5	56.5	58.9
13	58.9	39.4	39.4	7.8	23.2	27.0	35.0	39.4	64.0	53.8	53.8	58.9
14	58.9	39.4	39.4	7.8	23.2	27.0	35.0	39.4	64.0	53.8	53.8	61.5
15	58.9	39.4	41.7	7.8	23.2	27.0	35.0	39.4	61.5	53.8	53.8	61.5
16	53.8	39.4	41.7	7.8	23.2	27.0	35.0	39.4	61.5	53.8	53.8	58.9
17	53.8	39.4	39.4	7.8	23.2	27.0	35.0	39.4	58.9	53.8	64.0	58.9
18	53.8	39.4	39.4	7.8	23.2	27.0	35.0	39.4	56.5	53.8	64.0	53.8
19	53.8	39.4	39.4	7.8	27.0	48.9	35.0	39.4	35.0	53.8	61.5	53.8
20	53.8	39.4	41.7	7.8	27.0	48.9	35.0	39.4	97.0	53.8	56.5	53.8
21	53.8	39.4	41.7	7.8	27.0	48.9	35.0	39.4	97.0	53.8	56.5	53.8
22	53.8	39.4	41.7	5.4	27.0	48.9	35.0	39.4	97.0	53.8	56.5	53.8
23	48.9	39.4	41.7	5.4	27.0	37.2	58.9	39.4	53.8	53.8	56.5	53.8
24	48.9	39.4	44.1	13.3	27.0	35.0	64.0	39.4	53.8	53.8	56.5	64.0
25	48.9	39.4	46.4	19.6	28.9	35.0	64.0	37.2	53.8	53.8	56.5	64.0
26	48.9	39.4	48.9	16.3	30.9	35.0	58.9	37.2	53.8	53.8	56.5	61.5
27	48.9	39.4	51.4	16.3	30.9	35.0	53.8	35.0	53.8	58.9	56.5	61.5
28	48.9	39.4	53.8	7.8	28.9	35.0	53.8	35.0	53.8	58.9	56.5	64.0
29	48.9	.....	53.8	5.4	28.9	35.0	53.8	35.0	56.5	53.8	51.4	10.4
30	48.9	.....	53.8	3.1	28.9	35.0	53.8	35.0	53.8	53.8	53.8	64.0
31	48.9	.....	53.8	.....	27.0	.....	53.8	35.0	.....	53.8	.....	58.9
1908.												
1	61.5	56.5	56.5	122	119	133	91.0	85.3	85.3	82.4	82.4	82.4
2	56.5	56.5	58.9	122	119	106	91.0	85.3	85.3	82.4	82.4	82.4
3	56.5	56.5	61.5	122	106	106	91.0	106	85.3	82.4	82.4	82.4
4	56.5	56.5	58.9	82.4	119	106	91.0	106	85.3	82.4	82.4	82.4
5	56.5	56.5	61.5	91.0	119	106	88.0	106	85.3	82.4	82.4	82.4

Daily discharge, in second-feet, of Skaneateles Lake outlet at Willow Glen, N. Y., for 1907 and 1908—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.												
6	56.5	56.5	82.4	91.0	127	106	88.0	106	85.3	82.4	82.4	82.4
7	56.5	56.5	82.4	94.0	127	100	88.0	106	85.3	82.4	82.4	82.4
8	56.5	56.5	77.0	94.0	127	100	88.0	106	85.3	82.4	82.4	82.4
9	56.5	53.8	77.0	94.0	133	94.0	88.0	106	82.4	82.4	82.4	37.2
10	56.5	53.8	77.0	94.0	130	88.0	88.0	106	82.4	82.4	82.4	37.2
11	56.5	51.4	77.0	94.0	140	88.0	88.0	106	82.4	82.4	82.4	37.2
12	56.5	51.4	82.4	97.0	140	88.0	88.0	94.0	82.4	82.4	82.4	37.2
13	56.5	51.4	85.3	94.0	140	88.0	88.0	94.0	82.4	82.4	82.4	37.2
14	56.5	56.5	85.3	94.0	140	94.0	85.3	85.3	82.4	82.4	82.4	37.2
15	56.5	66.5	91.0	106	140	94.0	85.3	85.3	82.4	82.4	82.4	37.2
16	56.5	61.5	85.3	106	133	94.0	85.3	88.0	82.4	82.4	82.4	37.2
17	56.5	56.5	82.4	100	140	85.3	88.0	85.3	82.4	82.4	82.4	37.2
18	56.5	56.5	82.4	97.0	140	85.3	91.0	85.3	82.4	82.4	82.4	37.2
19	56.5	56.5	82.4	110	140	85.3	94.0	85.3	82.4	82.4	82.4	37.2
20	56.5	56.5	82.4	106	140	85.3	100	85.3	82.4	82.4	82.4	37.2
21	56.5	56.5	82.4	100	140	85.3	106	85.3	82.4	82.4	82.4	37.2
22	56.5	56.5	91.0	94.0	136	85.3	94.0	85.3	82.4	82.4	82.4	37.2
23	56.5	56.5	91.0	113	136	88.0	85.3	85.3	82.4	82.4	82.4	37.2
24	56.5	56.5	91.0	113	133	88.0	85.3	85.3	82.4	82.4	82.4	53.8
25	56.5	56.5	91.0	113	133	85.3	85.3	85.3	82.4	82.4	82.4	53.8
26	56.5	56.5	94.0	113	133	85.3	85.3	85.3	82.4	82.4	82.4	53.8
27	56.5	56.5	106	113	133	85.3	85.3	85.3	82.4	82.4	82.4	53.8
28	56.5	56.5	113	113	133	85.3	85.3	85.3	82.4	85.3	82.4	53.8
29	56.5	56.5	113	113	133	85.3	85.3	85.3	82.4	82.4	82.4	46.4
30	56.5	.....	113	113	133	85.3	85.3	85.3	82.4	82.4	82.4	48.9
31	56.5	.....	122	.....	133	.....	85.3	85.3	.....	82.4	.....	[a] 48.9

[a] Estimated.

Monthly discharge of Skaneateles Lake outlet at Willow Glen, N. Y., for 1906, 1907, and 1908.

[Drainage area, 74.2 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).[a]
	In outlet.	Through conduit.	Total.	Per square mile.[a]	
1906.					
January [b]	30.9	18.1	49.0	0.660	0.76
February [b]	30.7	19.7	50.4	.679	.71
March [b]	31.2	19.7	50.9	.686	.79
April	35.1	19.4	54.5	.735	.82
May	69.7	19.2	88.9	1.20	1.38
June	67.8	19.2	87.0	1.17	1.30
July	67.1	19.2	86.3	1.16	1.34
August	77.2	18.9	96.1	1.30	1.50
September	68.4	18.6	87.0	1.17	1.30
October	57.8	18.6	76.4	1.03	1.19
November	58.1	18.6	76.7	1.03	1.15
December	55.6	18.5	74.1	1.00	1.15
The year	54.1	19.0	73.1	.985	13.39
1907.					
January	51.2	18.6	69.8	0.941	1.08
February [c]	40.5	18.7	59.2	.798	.83
March [c]	42.8	18.8	61.6	.830	.96
April	15.0	18.9	33.9	.457	.51
May	25.8	19.0	44.8	.604	.70
June	32.6	19.0	51.6	.695	.78
July	41.9	19.0	60.9	.821	.95
August	38.6	19.0	57.6	.776	.89
September	52.6	18.7	71.3	.961	1.07
October	55.4	18.4	73.8	.995	1.15
November	56.4	18.4	74.8	1.01	1.13
December	55.9	18.4	74.3	1.00	1.15
The year	42.4	18.7	61.1	.824	11.20

[a] Including diversion for water supply of Syracuse.
[b] The discharge during January, February, and March, 1906, was slightly affected by ice.
[c] The discharge during February and March, 1907, was probably slightly affected by ice.

Monthly discharge of Skaneateles Lake outlet at Willow Glen, N. Y., for 1906, 1907, and 1908—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1908.					
January	56.7	18.4	75.1	1.01	1.16
February	56.3	18.6	74.9	1.01	1.09
March	85.0	19.0	104	1.40	1.61
April	104	19.0	123	1.66	1.85
May	132	19.0	151	2.04	2.35
June	93.0	19.0	112	1.51	1.68
July	88.8	19.0	108	1.46	1.68
August	92.0	19.0	111	1.50	1.73
September	83.2	19.0	102	1.37	1.53
October	82.5	19.0	102	1.37	1.58
November	82.4	19.0	101	1.36	1.52
December	52.6	19.0	71.6	.965	1.11
The year	84.0	18.9	103	1.39	18.89

NOTE.—Discharge measurements made during 1908 indicate that the above values for 1906 should be rated as fair (c) instead of approximate, as given in Water Supply Paper No. 206.
Values for 1907 and 1908 rated as fair (c).

ONEIDA RIVER NEAR EUCLID, N. Y.

This station is located at Schroeppel's bridge, about 7 miles upstream from Three River Point, and was established August 30, 1902, to obtain general information regarding the flow of Oneida River, which is of importance both for water-power development and canal purposes.

Gage-height observations are made by measuring down to the water surface from a reference point on the bulkhead coping of the lock at Oak Orchard state dam, 0.4 mile above Schroeppel's bridge. Gage readings are taken above the dam to avoid, as far as possible, backwater from ice or other causes, and the flow over the dam is computed on the basis of a rating curve constructed from current-meter measurements made at Schroeppel's bridge.

The reference datum has remained the same during the maintenance of the station. During the winter months ice occasionally affects the gage heights. Above a certain stage the dam becomes submerged and the discharge is modified. A special rating table, deduced from measurements made during the period of submergence, is used to calculate the discharge during the high period. Allowance is made for the opening of lock paddles in winter and for flashboards when used.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York, and this station has been maintained by the state engineer's department since May 1, 1907.

Daily discharge, in second-feet, of Oneida River near Euclid, N. Y., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	3,220	3,420	1,660	6,580	4,900	.....	1,450	1,240	a 574	574	1,350	a2,140
2	4,900	3,420	1,660	7,360	4,740	.....	1,570	1,300	700	616	1,350	2,070
3	6,090	a3,830	a1,660	7,100	4,740	.....	1,710	1,140	574	616	a1,190	2,000
4	6,580	3,620	1,660	7,100	4,520	.....	1,570	a1,140	530	616	1,400	2,000
5	6,580	3,620	1,660	6,580	a4,290	.....	1,570	1,240	530	616	1,570	1,780
6	a7,100	3,220	1,660	6,330	4,520	1,350	1,450	1,350	530	a 658	1,780	1,640
7	7,100	3,050	1,560	a6,330	4,740	1,570	a1,450	1,350	530	700	2,070	1,570
8	7,880	3,050	1,560	6,090	4,740	1,570	1,350	1,350	a 488	700	2,470	a1,710
9	7,660	2,880	1,560	5,350	4,290	a1,710	1,400	1,190	530	742	2,800	2,070
10	7,360	a2,880	a1,560	5,600	4,520	1,710	1,400	1,140	616	949	a2,890	2,470
11	7,360	2,880	1,560	5,840	4,520	1,850	1,240	a1,140	700	1,040	2,980	2,630
12	7,100	2,880	1,560	5,130	a4,740	1,710	1,240	1,090	700	1,040	2,890	2,140
13	a7,100	2,710	1,560	3,420	4,520	1,570	1,190	949	700	a1,040	2,800	1,500
14	6,840	2,370	1,560	a1,560	4,520	1,450	a1,140	949	700	1,090	2,800	1,300
15	6,580	2,370	1,660	1,150	4,740	1,450	1,090	949	a 700	1,140	2,720	a1,350
16	6,580	2,230	2,230	1,150	4,520	a1,450	1,040	949	700	1,090	2,630	1,410
17	7,360	a2,230	a2,370	1,150	4,290	1,350	949	866	616	1,040	a2,470	1,560
18	7,880	2,080	2,370	1,350	4,290	1,350	907	a 949	742	949	2,470	1,730
19	5,840	1,940	2,540	1,560	.....	1,350	990	949	783	824	2,290	1,730
20	a5,600	1,800	2,370	2,230	.....	1,450	1,140	866	658	a 783	2,290	1,730
21	5,600	1,800	2,540	a1,940	.....	1,350	a1,140	866	616	783	2,290	1,610
22	5,840	1,940	3,050	1,940	.....	1,240	1,190	700	a 616	783	2,210	a1,660
23	5,600	1,940	4,030	2,080	.....	a1,240	1,040	700	616	783	2,140	2,160
24	5,130	a2,080	a4,230	2,230	.....	1,240	990	700	574	742	a2,000	2,710
25	4,680	1,940	4,680	2,370	.....	1,240	1,040	a 616	446	700	2,000	3,220
26	4,450	1,800	5,600	3,050	.....	1,240	949	574	262	700	2,000	3,720
27	a4,450	1,660	5,840	3,620	.....	1,240	949	530	616	a 949	1,920	4,030
28	4,450	1,560	6,090	a4,680	.....	1,240	a 949	446	700	1,090	1,920	4,340
29	4,450	.....	6,330	4,450	.....	1,240	1,240	530	a 742	1,240	2,000	a4,450
30	4,450	.....	6,330	5,130	.....	a1,240	1,240	530	616	1,240	2,070	4,680
31	3,620	.....	a6,580	.....	.....	.....	1,140	530	.....	1,240	.....	4,130
1908.												
1	5,679	3,378	a3,972	7,566	6,048	3,284	1,904	1,640	852	784	a 960	1,584
2	5,802	a4,400	4,076	7,566	6,294	3,190	1,706	a1,584	750	818	1,000	1,838
3	5,556	4,846	3,972	7,566	a6,294	3,190	1,772	1,528	784	886	1,040	1,904
4	4,846	4,962	3,972	7,181	6,417	3,100	1,772	1,584	750	a 852	1,040	1,706
5	a4,846	5,310	3,972	a7,181	6,540	2,920	a1,706	1,584	750	886	1,080	1,472
6	6,797	5,310	3,868	7,053	6,668	2,920	1,640	1,528	a 750	886	1,168	a1,360
7	6,171	4,730	3,764	7,181	7,053	a2,740	1,584	1,360	784	886	1,120	1,416
8	4,846	4,510	a3,764	7,438	6,797	2,660	1,528	1,216	750	886	a1,264	1,416
9	4,730	a4,290	3,764	7,053	6,417	2,500	1,528	a1,360	750	886	1,216	1,360
10	4,620	3,660	3,764	7,053	a6,294	2,500	1,584	1,312	750	886	1,168	1,264
11	5,310	3,378	3,868	6,797	6,171	2,500	1,584	1,216	724	a 920	1,120	1,216
12	a4,510	3,190	4,076	a6,540	5,925	2,340	a1,528	1,216	724	886	1,000	1,120
13	3,972	3,566	4,510	6,171	6,048	2,266	1,360	1,216	a 698	920	1,080	a1,080
14	4,180	3,660	5,310	5,802	6,048	a2,420	1,360	1,216	698	886	1,120	960
15	4,076	4,180	a6,171	6,048	5,925	3,378	1,264	1,216	672	886	a1,168	920
16	3,764	a4,620	6,797	6,171	5,679	3,100	1,216	a1,216	672	852	1,168	784
17	3,764	5,679	6,925	6,294	a5,433	3,010	1,264	1,216	646	818	1,080	698
18	3,566	6,294	7,053	6,417	5,310	2,830	1,472	1,264	646	a 852	1,168	672
19	a3,472	6,171	7,053	a6,048	5,078	2,740	a1,706	1,120	698	886	1,216	606
20	3,378	5,802	7,053	6,048	4,730	2,580	1,772	1,168	a 750	852	1,216	a 606
21	3,378	5,194	6,797	6,048	4,400	a2,580	1,904	1,168	724	886	1,264	578
22	3,284	5,078	a6,797	5,925	4,400	2,660	1,970	1,080	698	886	a1,312	578
23	3,100	a4,962	6,540	5,802	4,180	2,660	2,118	a1,040	698	920	1,416	592
24	3,190	4,846	6,540	.....	a4,180	2,580	2,118	1,040	698	960	1,472	646
25	3,100	4,730	6,668	.....	4,180	2,500	2,118	1,000	724	a1,000	1,472	724
26	a2,920	4,400	6,797	(a)	4,076	2,500	a1,970	960	698	1,000	1,528	784
27	2,830	4,400	6,797	.....	3,764	2,340	1,904	960	a 750	920	1,416	a 852
28	2,920	4,180	6,797	.....	3,764	a2,192	1,838	960	750	886	1,416	852
29	3,100	4,180	a7,438	.....	3,566	2,118	1,838	960	750	920	a1,584	784
30	3,190	.....	7,566	.....	3,472	1,970	1,772	a1,000	750	1,000	1,528	750
31	3,284	.....	7,566	.....	a3,378	.....	1,772	920	.....	1,000	.....	784

a Sunday.

NOTE.—No record May 19 to June 5, 1907.

Monthly discharge of Oneida River near Euclid, N. Y., for 1907 and 1908.

[Drainage area, 1,400 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area.)
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	7,880	3,220	5,980	4.27	4.92
February	3,830	1,560	2,540	1.81	1.88
March	6,580	1,560	2,940	2.10	2.42
April	7,360	1,150	4,020	2.87	3.20
May 1–18	4,900	4,290	4,560	3.26	2.18
June 6–30	1,850	1,240	1,420	1.01	.94
July	1,710	907	1,220	.871	1.00
August	1,350	446	930	.664	.77
September	783	262	614	.439	.49
October	1,240	574	873	.624	.72
November	2,980	1,190	2,190	1.56	1.74
December	4,680	1,300	2,360	1.69	1.95
1908.					
January	6,800	2,830	4,130	2.95	3.40
February	6,290	3,190	4,620	3.30	3.56
March	7,570	3,760	5,610	4.01	4.62
April 1–23	7,570	5,800	6,650	4.75	4.06
May	7,050	3,380	5,310	3.79	4.37
June	3,380	1,970	2,680	1.91	2.13
July	2,120	1,220	1,700	1.21	1.40
August	1,640	920	1,220	.871	1.00
September	852	646	728	.520	.58
October	1,000	784	897	.641	.74
November	1,580	960	1,230	.879	.98
December	1,900	578	1,030	.736	.85

SALMON RIVER DRAINAGE BASIN.

DESCRIPTION.

Salmon River rises in the southwestern part of Lewis County, N. Y., flows southward and then northwestward, and enters Lake Ontario near Port Ontario. Its drainage area comprises about 285 square miles. The topography is generally rolling in character, and the soil is sandy, rock lying near the surface in the upper part of the basin, where there are also extensive tracts of original forest.

The mean annual precipitation is about 35 inches, and during the winter there is usually a heavy fall of snow, which often accumulates in the forest areas to a depth of several feet and whose slow melting in the spring operates to prevent extremely high freshets.

The basin affords several opportunities for storage. At High Falls there is an undeveloped fall of 110 feet in a very short distance, and the river is rather important in its power possibilities for a stream of its size.

The following gaging station has been maintained in this river basin: Salmon River near Pulaski, N. Y., 1900–1908.

SALMON RIVER NEAR PULASKI, N. Y.

This station is located on the first highway bridge above the village of Pulaski, and was established September 5, 1900. The gage was taken out by ice during the winter of 1901–2, which caused a temporary break in the record. The gage was replaced and readings resumed July 23, 1902. The station was again discontinued June 30, 1907, reestablished August 16, 1908, and discontinued December 6, 1908. The station can be reached by a short drive from either Pulaski or Richland. Conditions are poor for records during the winter, when the channel usually becomes clogged with ice. The open channel rating is fairly good. The gage datum has remained the same throughout the period of records.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

The following measurement was made October 17, 1908: Width, 164 feet; area, 212 square feet; gage height, 2.52 feet; discharge, 125 second-feet.

Daily gage height, in feet, of Salmon River near Pulaski, N. Y., for 1907 and 1908.

[Observer, Seymour J. Fox.]

Day.	Jan.	Feb.	Mar.	Apr.	May	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1907.[a]							1907.						
1	5.05	3.00	.....	4.78	4.48	3.55	16	2.98	.....	.....	3.45	3.80	2.95
2	4.55	3.05	.....	4.48	4.05	3.38	17	3.00	.....	.....	3.45	4.05	2.90
3	4.18	3.10	.....	4.40	3.72	3.28	18	3.02	.....	.....	3.55	3.78	2.88
4	6.22	3.12	.....	4.30	4.30	3.18	19	3.15	.....	.....	3.40	3.60	2.80
5	6.00	3.12	.....	4.10	5.02	3.18	20	3.75	.....	.....	3.30	3.45	2.75
6	4.80	3.18	.....	3.98	4.20	4.85	21	3.65	.....	4.05	3.22	3.32	2.72
7	4.45	3.05	.....	3.90	3.95	5.70	22	3.70	.....	4.15	3.28	3.25	2.70
8	4.60	3.10	.....	3.80	3.60	4.58	23	3.05	.....	4.50	3.35	.....	2.62
9	4.10	3.05	.....	3.78	3.60	3.90	24	3.10	.....	5.58	3.92	.....	2.65
10	3.35	3.08	.....	3.60	3.50	3.52	25	3.10	.....	5.75	4.30	.....	2.62
11	3.70	3.00	.....	3.60	3.55	3.38	26	3.10	.....	5.60	4.22	3.18	2.68
12	3.45	3.00	.....	3.75	3.60	3.22	27	3.10	.....	5.38	4.25	3.52	2.68
13	3.42	.....	.....	3.62	3.45	3.18	28	3.10	.....	6.82	4.05	3.80	2.72
14	3.42	.....	.....	3.62	3.38	3.12	29	3.00	.....	6.60	3.90	3.55	2.80
15	3.38	.....	.....	3.52	3.28	3.05	30	3.00	.....	6.42	3.90	3.42	2.95
							31	3.00	.....	5.75	.....	3.58	.....

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1908.						1908.					
1	.....	2.45	2.72	2.70	3.18	16	2.68	2.45	2.60	3.05	.....
2	.....	2.45	2.62	2.70	3.22	17	2.75	2.40	2.50	3.05	.....
3	.....	2.45	2.58	2.62	3.15	18	2.80	2.40	.....	3.00	.....
4	.....	2.50	2.50	2.70	3.05	19	2.78	2.40	.....	3.00	.....
5	.....	2.52	2.50	2.75	3.00	20	2.75	.....	.....	3.05	.....
6	.....	2.60	2.50	2.80	2.85	21	2.70	.....	.....	3.08	.....
7	.....	2.60	2.45	2.85	3.00	22	2.62	.....	.....	3.05	.....
8	.....	2.60	2.45	2.90	.....	23	2.60	.....	.....	3.08	.....
9	.....	2.55	2.45	3.02	.....	24	2.58	.....	.....	3.08	.....
10	.....	2.45	2.45	3.25	.....	25	2.58	.....	.....	3.48	.....
11	.....	2.45	2.55	3.52	.....	26	2.50	.....	.....	4.15	.....
12	.....	2.45	2.62	3.72	.....	27	2.50	2.35	.....	4.25	.....
13	.....	2.45	2.70	3.62	.....	28	2.45	2.35	.....	3.70	.....
14	.....	2.45	2.65	3.25	.....	29	2.45	2.82	.....	3.45	.....
15	.....	2.45	2.62	3.10	.....	30	2.50	3.02	.....	3.32	.....
						31	2.50	.....	.....	.....	.....

[a] River frozen over February 13 to March 20, 1907.

Rating table for Salmon River near Pulaski, N. Y., for 1906–1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
2.30	67	3.40	620	4.50	1,830	5.60	3,950
2.40	93	3.50	697	4.60	1,980	5.70	4,200
2.50	124	3.60	781	4.70	2,140	5.80	4,490
2.60	161	3.70	865	4.80	2,300	5.90	4,780
2.70	204	3.80	965	4.90	2,470	6.00	5,100
2.80	253	3.90	1,060	5.00	2,640	6.20	5,770
2.90	307	4.00	1,170	5.10	2,840	6.40	6,530
3.00	364	4.10	1,300	5.20	3,020	6.60	7,340
3.10	422	4.20	1,420	3.30	3,240	6.80	8,190
3.20	480	4.30	1,550	5.40	3,460	7.00	9,070
3.30	550	4.40	1,680	5.50	3,700		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made 1902–1908 and is fairly well defined.

Monthly discharge of Salmon River near Pulaski, N. Y., for 1907 and 1908.

[Drainage area, 259 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	5,850	353	1,160	4.48	5.16	B.
February 1–12	468	364	405	1.56	.70	B.
March 21–31	8,280	1,240	4,240	16.40	6.71	B.
April	2,270	494	1,040	4.02	4.48	B.
May	2,680	468	894	3.45	3.98	B.
June	4,200	170	636	2.46	2.74	B.
1908.						
August 16–31	253	108	169	.653	.39	B.
September	376	80	121	.467	.52	B.
October	214	108	153	.591	.68	B.
November	1,480	170	507	1.96	2.19	B.
December 1–7	494	280	402	1.55	.40	B.

NOTE.—Discharge interpolated September 20 to 26 and October 18 to 31, 1908.

BLACK RIVER DRAINAGE BASIN.

DESCRIPTION.

Black River rises in the western part of Hampden County, N. Y., flows southwestward across Herkimer County into Oneida County, turns near Forestport and runs somewhat west of north through Lewis County to eastern Jefferson County, and then flows westward to Black River Bay, at the eastern extremity of Lake Ontario. Its total drainage area is 1,930 square miles. The upper part of the basin is very rugged and mountainous, contains a large number of lakes, and is in a part of the Adirondack forest.

The mean annual precipitation is about 40 inches, ranging from 55 inches in the extreme headwaters to perhaps 30 inches near Lake Ontario. The winters are generally quite severe, and the stream flow is affected by ice for periods of several months.

The regimen of the river is controlled by storage on its upper tributaries, including Beaver River at Beaver, a series of reservoirs at the headwaters of Moose River, and additional reservoirs at Forestport and on the headwaters of the main river. (Pl. VII, *B*.)

Water is diverted from Black River through Forestport feeder to supply the Black River Canal at Boonville. A portion of this diverted water flows northward from Boonville and enters Black River again at Lyons Falls; the remainder flows southward through the Black River Canal and enters the Erie Canal at Rome.

The following gaging stations have been maintained in this river basin:

Black River near Felts Mills, Watertown, N. Y., 1902–1908.
Black River at Huntingtonville dam, near Watertown, N. Y., 1897–1901.
Moose River at Moose River, N. Y., 1900–1908.
Beaver River at Croghan, N. Y., 1901–1903.

BLACK RIVER NEAR FELTS MILLS, N. Y.

This station is located at the dam of the Harmon Paper Company, formerly owned by the Black River Traction Company, near the village of Felts Mills, 9 miles upstream from Watertown, and 7 miles upstream from the old Huntingtonville gaging station on this stream. It was established August 29, 1902, and since May 1, 1907, has been maintained by the state engineer's department.

The dam is of sawed timber, rests on limestone foundation, and is very nearly water-tight. It has a slope on the upstream face of 2.88 horizontal to 1 vertical. The crest is protected by boiler plate and the downstream face is vertical, giving a free overfall. The main crest is 380.6 feet long. There are two additional sections on the right-hand side, one 14.1 feet long and the other 17.9 feet. A similarly constructed dam, 117 feet long, at the left bank, serves as an auxiliary spillway and as a headrace wall.

The gage, which is read twice daily, at 7 a. m. and 6 p. m., is attached vertically to a crib at the left-hand side of the stream above the mill. Correction is made to the gage readings for velocity of approach during high water. The discharge over the spillways has been calculated by means of the weir formula, using coefficients derived from experiments of the United States Geological Survey for a dam of similar cross section.

A wood-pulp mill has been constructed adjacent to this dam and was in operation during 1907. The mill contains four 72-inch and one 45-inch Smith-McCormick turbines. A record is kept of the hours run, and gate opening of each wheel, as well as of the head under which they operate.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Daily discharge, in second-feet, of Black River near Felts Mills, N. Y., for 1907 and 1908.

Day.	Jan.[a]	Feb.[a]	Mar.[a]	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	.....	.....	.....	16,755	8,769	2,531	2,282	790	[b] 298	1,274	4,121	[b] 1,265
2	.....	.....	.....	13,795	8,965	[b] 2,676	2,116	882	442	2,294	2,690	2,116
3	.....	.....	.....	10,866	8,769	3,229	2,583	761	790	2,151	[b] 2,877	1,673
4	.....	.....	.....	7,499	8,769	2,157	2,044	[b] 752	731	2,022	6,413	1,598
5	.....	.....	.....	7,143	[b] 12,636	1,839	2,859	874	1,373	3,185	6,757	1,780
6	.....	.....	.....	6,160	10,171	1,913	1,443	836	2,706	[b] 2,848	6,929	1,698
7	.....	.....	.....	[b] 5,988	9,785	3,245	[b] 1,265	1,054	1,987	5,733	8,085	1,618
8	.....	.....	.....	5,840	9,369	3,375	1,141	983	[b] 2,381	5,695	9,701	[b] 1,476
9	.....	.....	.....	3,931	8,573	[b] 3,368	1,141	914	1,499	6,305	9,733	2,510
10	.....	.....	.....	3,807	8,769	3,083	1,329	2,226	1,488	6,585	[b] 8,560	4,429
11	.....	.....	.....	3,683	6,489	2,687	1,084	[b] 723	1,427	6,069	8,360	7,889
12	.....	.....	.....	3,683	[b] 4,760	2,441	817	896	1,941	5,967	7,481	8,532
13	.....	.....	.....	3,735	7,765	2,116	1,730	1,103	2,743	[b] 6,200	5,749	8,254
14	.....	.....	.....	[b] 3,960	4.133	1,994	[b] 1,312	817	2,855	4,529	4,825	7,563
15	.....	.....	.....	4,303	3,846	1,685	1,864	783	[b] 3,063	3,985	4,121	[b] 7,728
16	.....	.....	.....	4,725	3,289	[b] 1,360	1,285	596	1,607	3,229	3,547	4,529
17	.....	.....	.....	5,971	3,637	1,242	868	1,412	1,387	2.743	[a] 3,960	4,257
18	.....	.....	.....	5,646	4,009	986	1,255	[b] 350	1,692	2,394	3,431	4,121
19	.....	.....	.....	5,651	[b] 2,676	1,248	868	576	1,181	2,246	3,005	3,725
20	.....	.....	.....	5,036	4,615	1,535	1,126	596	1,226	[b] 2,299	3,005	3,353
21	.....	.....	.....	[b] 2,168	3,003	1,548	[b] 804	609	1,080	1,873	2,855	3,175
22	.....	.....	.....	5,704	2,808	2,354	1,539	625	[b] 1,005	1,873	3,061	[b] 2,676
23	.....	.....	.....	4,948	2,707	[b] 1,472	868	715	946	1,954	3,423	3,592
24	.....	.....	.....	5,022	2,710	1,618	1,164	1,138	1,415	2.075	[b] 2,812	4,521
25	.....	.....	.....	3,933	2,644	1,537	1,346	[b] 152	1,320	1,994	3,398	7,324
26	.....	.....	.....	5,581	[b] 2,292	1,383	868	10	1,820	1,599	3,118	9,069
27	.....	.....	.....	6,787	2,294	980	802	547	1,901	[b] 2,187	3,006	9,037
28	.....	.....	.....	[b] 8,144	2,687	1,171	[b] 980	635	1,941	2,536	2,416	10,915
29	.....	.....	.....	9,267	3,023	522	1,498	670	[b] 3,018	4,529	3,118	[b] 11,092
30	.....	.....	.....	8,235	2,634	[b] 1,123	1,255	614	2,104	4,825	2,938	10,089
31	.....	.....	.....	.....	2,341	.....	859	601	.....	4,529	.....	10,309
1908.												
1	.....	.....	[b] 2,768	12,806	12,335	3,310	1,263	1,096	884	1,245	[b] 1,082	1,908
2	.....	.....	3,272	10,883	12,589	3,310	1,268	[b] 683	839	1,276	1,152	1,886
3	.....	.....	3,813	9,822	[b] 12,044	3.082	863	1,336	808	1,208	1,158	1,657
4	.....	.....	3,034	8,189	12,844	2,413	502	1,097	791	[b] 998	1,158	1,552
5	.....	.....	3,344	[b] 7,078	11,105	2,461	[b] 658	1,054	916	1,739	1,128	1,125
6	.....	.....	3,687	6,537	9,612	2,397	912	964	[b] 450	1,258	1,695	[b] 1,180
7	.....	.....	3,235	6,886	8,585	[b] 1,887	1,165	997	1,157	1,255	1,060	2,011
8	.....	.....	[b] 2,504	8,189	7,991	2,111	1,607	1,127	862	1,128	[b] 714	2,212
9	.....	.....	3,322	9,191	8,333	2,041	1,617	[b] 602	803	1,158	1,396	1,932
10	.....	.....	2,986	10,921	[b] 8,945	1,999	1,679	1,340	902	1,060	1,189	1,663
11	.....	.....	3,139	11,243	12,375	1,657	1,626	1,194	851	[b] 445	1,307	1,733
12	.....	.....	3,105	[b] 11,280	8,740	1,417	[b] 741	1,133	763	1,508	1,534	1,812
13	.....	.....	3,493	11,620	7,805	1,385	1,266	1,054	[b] 384	1,367	1,513	[b] 1,723
14	.....	.....	4,437	9,678	7,060	[b] 699	1,058	1,315	792	1,367	1,616	1,511
15	.....	.....	[b] 6,682	8,981	6,712	2,293	935	1,309	853	1,276	[b] 1,320	1,632
16	.....	.....	9,209	8,189	6,658	3,253	1,017	[b] 933	721	1,089	1,371	1,208
17	.....	.....	8,773	7,991	[b] 6,496	2,817	961	1,498	746	1,024	1,517	1,693
18	.....	.....	7,991	7,890	7,100	2,413	1,187	1,194	705	[b] 998	1,438	2,128
19	.....	.....	7,783	[b] 6,682	5,703	2,094	[b] 2,168	1,103	621	1,545	1,398	1,773
20	.....	.....	7,621	7,805	5,079	1,855	3,431	1,054	[b] 353	869	1,337	[b] 871
21	.....	.....	6,832	7,432	4,491	[b] 2,504	2,837	1,073	716	942	1,097	1,302
22	.....	.....	[b] 5,751	7,060	3,939	3,413	2,949	887	814	839	[b] 1,125	1,048
23	.....	.....	5,989	6,537	3,837	2,262	3,353	[b] 723	788	870	1,337	1,338
24	.....	.....	5,861	6,363	[b] 3,182	2,509	2,204	753	750	733	1,438	610
25	.....	.....	7,286	6,658	3,979	2,606	1,901	668	676	[b] 414	1,337	171
26	.....	.....	7,060	[b] 6,682	3,310	2,461	[b] 845	610	647	1,088	2,075	996
27	.....	.....	8,981	8,585	2,912	1,776	1,431	655	[b] 323	878	2,462	[b] 890
28	.....	.....	6,627	9,822	2,817	[b] 1,287	733	507	806	865	2,893	1,004
29	.....	.....	[b] 15,155	11,381	2,855	2,674	1,224	756	922	1,097	[b] 2,050	1,442
30	.....	.....	15,532	11,820	2,553	1,393	1,038	[b] 1,312	1,144	1,128	2,318	1,981
31	.....	.....	15,494	.....	[b] 2,001	.....	850	1,005	.....	1,292	.....	1,483

[a] Ice obstruction prevailed during portions of January, February, and March, 1907, and during January and February, 1908. There was some ice obstruction during December, 1908.
[b] Sunday.

Monthly discharge of Black River near Felts Mills, N. Y., for 1907 and 1908.

[Drainage area, 1,850 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
April	16,800	2,170	6,270	3.39	3.78
May	12,600	2,290	5,450	2.95	3.40
June	3,380	522	1,950	1.05	1.17
July	2,860	802	1,370	.741	.85
August	2,230	10	782	.423	.49
September	3,060	298	1,650	.892	1.00
October	6,580	1,270	3,480	1.88	2.17
November	9,730	2,420	4,780	2.58	2.88
December	11,100	1,260	5,220	2.82	3.25
1908.					
March	15,500	2,500	6,280	3.39	3.91
April	12,800	6,360	8,810	4.76	5.31
May	12,800	2,000	6,900	3.73	4.30
June	3,410	699	2,260	1.22	1.36
July	3,430	502	1,460	.789	.91
August	1,500	507	1,000	.541	.62
September	1,160	323	760	.411	.46
October	1,740	414	1,100	.595	.69
November	2,890	714	1,470	.795	.89
December	2,210	171	1,470	.795	.92

MOOSE RIVER AT MOOSE RIVER, N. Y.

This station is located in Moose River village, and was established June 5, 1900, to obtain general statistical data regarding the flow of Moose River.

It is about 2 miles below the McKeever dam, which is maintained for logging. Just below the station a considerable fall occurs. Occasionally ice and log jams form at an island just above the station. During the winter months discharge is usually affected by ice, the gage being read but once a week during this period.

The elevation of the gage zero was changed on February 28, 1903, from 15.36 feet to 15.53 feet. Conditions for obtaining discharge are fairly good, and a fairly good rating curve has been developed for open-channel conditions.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Moose River at Moose River, N. Y., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.ft.*	*Feet.*	*Sec.-ft.*
1907.					
October 26	H. K. Barrows	263	487	1.45	405
1908.					
May 11	D. M. Wood	226	1,090	4.03	1,970
September 2	C. E. Allen	214	432	1.04	310
October 31	C. R. Adams	212	441	1.00	297

Daily gage height, in feet, of Moose River at Moose River, N. Y., for 1907 and 1908.

[Observer, Chris Hannon.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	2.65	1.35	2.2	4.95	6.15	2.15	2.4	0.95	0.65	1.8	2.4	1.55
2	3.5	1.5	2.55	4.4	4.85	2.55	2.6	.8	.65	1.3	2.45	1.55
3	3.25	1.45	2.5	3.8	4.2	2.0	2.7	.75	1.55	1.3	2.6	1.55
4	3.35	1.3	2.25	3.7	4.6	1.9	2.4	.75	2.15	1.6	4.35	1.65
5	4.35	1.4	2.15	3.6	5.55	1.8	1.95	.65	3.15	2.35	4.1	1.65
6	4.15	1.4	2.1	3.4	4.4	1.9	1.75	.95	2.5	2.3	3.1	1.65
7	3.8	1.4	2.1	3.2	4.2	2.35	2.0	1.2	1.75	2.25	3.45	1.55
8	3.3	1.3	2.1	3.0	4.15	2.75	1.35	1.0	1.5	3.45	4.85	1.45
9	3.25	1.3	2.1	3.1	3.85	2.5	.85	.7	1.25	5.9	4.4	1.65
10	3.05	1.3	2.1	3.0	3.6	2.25	.85	.75	1.15	4.25	3.7	2.75
11	3.0	1.4	2.1	3.15	3.7	2.0	.95	.9	1.15	3.75	3.4	6.1
12	2.85	1.5	2.1	2.75	3.35	1.8	1.05	.8	3.2	3.5	3.1	5.15
13	2.65	1.5	2.1	2.35	3.15	1.6	1.05	.65	2.75	3.25	3.0	4.15
14	2.4	1.5	2.2	2.45	3.0	1.55	1.15	.55	2.25	3.25	2.9	3.35
15	2.2	1.5	2.2	1.65	2.8	1.5	1.2	.55	1.85	3.0	2.75	3.05
16	2.2	1.5	2.1	1.35	2.6	1.45	1.05	.65	1.4	2.75	2.6	2.65
17	2.1	1.5	2.1	1.75	2.45	1.3	.95	.65	1.25	2.5	2.4	2.65
18	2.1	1.5	2.1	2.45	2.4	1.15	.85	.75	1.4	2.2	2.25	2.45
19	2.2	1.5	2.2	1.9	2.55	.95	.95	.75	1.2	2.0	2.15	2.45
20	2.3	1.5	2.3	1.65	2.75	2.8	1.05	.75	1.0	1.8	2.05	2.35
21	2.4	1.6	2.25	1.55	2.7	2.65	1.15	.75	.8	1.85	2.05	2.25
22	2.55	1.7	2.3	1.45	2.55	2.15	1.25	.7	.75	1.75	2.05	2.35
23	2.5	1.8	2.3	1.7	2.45	1.85	1.15	.65	1.15	1.65	2.3	2.45
24	2.35	1.95	2.45	2.15	2.35	1.45	1.05	.6	1.15	1.65	2.25	3.2
25	2.2	2.15	2.8	4.75	2.25	1.35	.95	.25	1.4	1.65	2.15	4.15
26	2.1	2.1	3.05	4.4	2.0	1.25	.85	.25	1.7	1.45	2.15	4.5
27	2.0	2.1	3.2	5.45	2.15	1.3	1.15	.65	1.85	1.9	1.95	3.75
28	1.95	2.1	4.8	4.75	2.45	1.6	1.1	.75	1.9	2.3	1.65	3.65
29	1.8	.....	.....	4.65	2.45	1.4	1.0	.65	2.1	3.25	1.65	3.6
30	1.7	.....	.....	5.15	2.0	1.6	.95	.65	2.45	3.25	1.65	3.65
31	1.55	.....	.....	.....	1.8	.....	.85	.65	.....	2.85	.....	3.95
1908.												
1	3.75	2.55	.....	4.3	6.35	2.3	.8	1.1	1.1	1.5	.9	1.4
2	3.6	2.55	.....	4.1	6.2	2.25	.8	1.2	1.0	1.4	.9	1.3
3	3.55	2.45	.....	3.8	6.0	2.1	.95	1.2	.9	1.3	.9	1.4
4	3.65	2.35	.....	3.6	5.7	2.0	.9	1.3	.9	1.2	.95	1.5
5	3.55	2.2	.....	3.6	5.3	1.9	1.1	1.2	1.0	1.1	1.0	1.6
6	3.25	2.05	.....	3.4	4.85	1.75	1.4	1.2	1.1	1.0	.9	1.5
7	3.1	2.15	.....	3.55	4.35	1.55	1.8	1.1	1.1	.9	.75	1.35
8	2.9	2.15	.....	4.15	4.3	1.5	1.65	1.1	1.1	.45	.7	1.2
9	2.75	2.15	.....	5.35	4.95	1.4	1.6	1.0	1.0	.2	.7	1.1
10	2.5	2.15	.....	5.3	4.5	1.3	1.45	1.0	1.0	.45	.2	1.2
11	2.35	2.05	.....	5.25	4.0	1.2	1.2	.9	1.0	.7	.8	1.3
12	2.25	.....	.....	5.2	4.2	1.1	1.05	1.0	1.0	.8	1.5	1.1
13	2.1	.....	.....	4.95	4.6	1.05	.9	1.1	1.0	.9	1.45	1.25
14	2.15	.....	.....	4.3	4.55	2.2	.9	1.2	1.0	.8	1.2	1.5
15	2.15	.....	.....	4.4	4.3	2.0	.9	1.1	.9	.8	1.05	1.4
16	2.05	.....	.....	4.4	4.0	2.2	.8	1.1	.85	.9	.8	1.15
17	2.05	.....	.....	4.55	3.85	2.2	.9	1.0	.8	.9	.7	1.2
18	2.05	.....	.....	4.85	3.75	2.1	1.0	1.0	.8	1.0	.7	1.1
19	2.05	.....	.....	4.75	3.45	2.0	1.1	.9	.9	1.0	.7	1.1
20	1.95	.....	.....	4.45	3.2	1.85	1.1	.9	1.0	.9	.6	1.0
21	1.95	.....	.....	4.2	3.0	1.65	1.0	.8	1.0	.9	.75	1.05
22	1.95	.....	.....	4.2	2.95	1.45	1.0	.9	1.0	.8	.8	1.1
23	1.85	.....	.....	4.3	3.15	1.2	1.0	.9	.9	.8	.9	1.1
24	1.85	.....	.....	5.15	2.9	1.2	.9	.95	.9	.7	.9	1.0
25	1.85	.....	.....	6.0	2.6	1.35	.9	1.0	.9	.7	1.0	.9
26	1.85	.....	.....	6.7	2.45	1.55	.9	1.0	.8	.7	1.9	.8
27	1.95	.....	.....	7.05	2.35	1.6	1.0	.9	.8	.7	2.25	1.05
28	1.95	.....	.....	7.2	2.3	1.4	1.1	.9	.8	.8	2.2	1.25
29	1.95	.....	5.15	6.2	2.2	1.25	1.1	.8	1.1	.8	1.95	1.1
30	2.25	.....	4.85	6.6	2.1	.95	1.05	.9	1.35	.9	1.6	1.0
31	2.55	.....	4.6	.....	2.2	.....	1.0	1.0	.....	1.0	.....	.9

NOTE.—Ice conditions prevailed from about February 5 to March 31, 1907. Discharge probably affected by ice conditions from January 30 to March 28 and December 4 to 31.

Rating table for Moose River at Moose River, N. Y., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.20	140	1.60	465	3.00	1,150	4.80	2,780
.30	155	1.70	500	3.10	1,220	5.00	3,020
.40	170	1.80	535	3.20	1,290	5.20	3,260
.50	190	1.90	570	3.30	1,360	5.40	3,520
.60	210	2.00	610	3.40	1,430	5.60	3,790
.70	230	2.10	650	3.50	1,510	5.80	4,070
.80	250	2.20	700	3.60	1,590	6.00	4,360
.90	275	2.30	750	3.70	1,670	6.20	4,660
1.00	300	2.40	800	3.80	1,760	6.40	4,960
1.10	325	2.50	855	3.90	1,850	6.60	5,260
1.20	350	2.60	910	4.00	1,940	6.80	5,580
1.30	375	2.70	965	4.20	2,140	7.00	5,900
1.40	405	2.80	1,025	4.40	2,340	7.20	6,220
1.50	435	2.90	1,085	4.60	2,560		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on four discharge measurements made during 1907 and 1908 and the form of the 1906 curve, and is well defined between gage heights 0.8 foot and 5.5 feet.

Monthly discharge of Moose River at Moose River, N. Y., for 1907 and 1908.

[Drainage area, 346 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	2,290	450	988	2.86	3.30	B.
February	.....	.....	272	.786	.82	D.
March	.....	.....	755	2.18	2.51	D.
April	3,580	390	1,430	4.13	4.61	B.
May	4,580	535	1,450	4.19	4.83	B.
June	1,020	288	573	1.66	1.85	B.
July	965	262	406	1.17	1.35	B.
August	350	148	234	.676	.78	B.
September	1,290	220	525	1.52	1.70	B.
October	4,210	375	985	2.85	3.29	B.
November	2,840	482	1,070	3.09	3.45	B.
December	4,510	420	1,240	3.58	4.13	B.
The year	.....	148	827	2.39	32.62	
1908.						
January	1,720	552	851	2.46	2.84	B.
February	.....	.....	834	2.41	2.60	D.
March	.....	.....	1,500	4.34	5.00	D.
April	6,220	1,430	2,990	8.64	9.64	B.
May	4,880	650	2,050	5.92	6.82	B.
June	750	288	499	1.44	1.61	B.
July	535	250	321	.928	1.07	B.
August	375	250	305	.882	1.02	B.
September	390	250	292	.844	.94	B.
October	435	140	271	.783	.90	B.
November	725	140	328	.948	1.06	B.
December	.....	.....	303	.876	1.01	D.
The year	6,220	140	879	2.54	34.51	

NOTE.—Discharge during frozen periods 1907 and 1908 based mainly on the discharge of Oswegatchie River at Ogdensburg, where the flow is not affected by ice conditions. Discharge January 30–31, 1908, 560 second-feet; February 1–15, 400 second-feet; February 16–29, 1,300 second-feet; March 1–28, 1,350 second-feet; December 4–31, 293 second-feet.

ST. LAWRENCE RIVER DRAINAGE BASIN.

GENERAL FEATURES.

St. Lawrence River, the outlet of the Great Lakes system, receives also the flow of a number of New York streams having their sources in a northerly slope of the Adirondacks and fed by the innumerable lakes with which the region is dotted. Some of these rivers, as the Grass, Raquette, and St. Regis, lie entirely within the United States; others, notably Salmon, Trout, Chateaugay, and English rivers, cross the international boundary and flow northward into the St. Lawrence in Canada, as does also Richelieu River, the outlet of Lake Champlain. The following table gives a list of the principal tributaries of the St. Lawrence in the United States, with the areas drained by them:

Drainage areas of St. Lawrence River tributaries in the United States.

	Square miles.		Square miles.
Oswegatchie River	1,609	Salmon River [a]	273
Grass River	637	Trout River [b]	129
Raquette River	1,219	Chateaugay River [b]	199
St. Regis River	910	English River [b]	53
Little Salmon River [a]	103	Lake Champlain [b]	8,187

The St. Lawrence drains, through Lake Champlain, an area of 4,560 square miles in the State of Vermont. This drainage is practically all from Missisquoi, Lamoille, and Winooski rivers and Otter Creek.

OSWEGATCHIE RIVER DRAINAGE BASIN.

DESCRIPTION.

Oswegatchie River has its source in the region of lakes and timbered swamps in the southern part of St. Lawrence County, N. Y. The largest of the lakes is Cranberry Lake, which affords valuable storage to water-power users on its outlet, East Branch of Oswegatchie River. The East and West branches flow in a general northwesterly direction and unite near Talcville. From Gouverneur to Oxbow the river flows southwestward; it then turns sharply and flows northeastward to Rensselaer Falls, turns again to the northwest, receives the outlet of Black Lake at Galilee, and finally enters the St. Lawrence at Ogdensburg. Its total drainage area comprises about 1,600 square miles.

The mean annual precipitation is about 35 inches, and winter conditions are usually severe.

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[a] Above junction near international boundary.
[b] Above New York state line.

The basin affords numerous opportunities for water storage and the utilization of these sites is especially desirable, on account of the quick spilling character of this area and the tendency to floods. Considerable water power is developed, mostly in small units, and there is a large amount of undeveloped power.

The following gaging station has been maintained in this river basin: Oswegatchie River near Ogdensburg, N. Y., 1903–1908.

OSWEGATCHIE RIVER NEAR OGDENSBURG, N. Y.

This station is located at what is known as the Eel Weir highway bridge, about 6 miles upstream from Ogdensburg, N. Y., and one-half mile below Black Lake outlet. It was established May 16, 1903, and has been maintained continuously since that date to obtain information for use in studies of power and storage development on Oswegatchie and Black rivers.

There are three dams in the vicinity of the gaging station on Oswegatchie River, one at Heuvelton about 5 miles above, one at Rensselaer Falls 10 miles above, and one in the city of Ogdensburg about one-half mile above the outlet.

Open-water conditions prevail at this station throughout the year. The stream bed is rocky and permanent and the results are considered fairly good for all stages. The gage datum has remained the same since the beginning of the record.

Information in regard to this station is contained in the annual reports of the state engineer and surveyor, state of New York.

Discharge measurement of Oswegatchie River near Ogdensburg, N. Y., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
1907. March 9 [a]	C. C. Covert	222	370	4.90	1,120
1908. September 9 [b]	C. E. Allen	213	366	4.82	753

[a] Shore ice and ice around piers. River open below for 2 miles until backwater from dam at Ogdensburg interferes. Discharge probably not reduced by the ice conditions.
[b] Measurement poor on account of clogging of meter by eel grass.

Daily gage height, in feet, of Oswegatchie River near Ogdensburg, N. Y., for 1907 and 1908.

[Observer, Joseph H. La Rue.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	5.3	5.6	4.5	8.5	5.8	5.4	4.9	4.5	4.4	4.8	5.1	5.5
2	5.6	5.4	4.6	8.5	6.1	5.3	4.9	4.5	4.4	4.8	5.2	5.4
3	6.4	5.4	4.6	8.2	6.3	5.2	4.9	4.5	4.4	4.9	5.4	5.4
4	6.4	5.4	4.6	8.1	6.4	5.1	4.8	4.5	4.4	5.0	5.4	5.3
5	6.7	5.3	4.8	7.7	6.8	5.2	4.8	4.5	4.5	5.0	5.4	5.3
6	7.4	5.1	4.8	7.3	6.9	5.2	4.8	4.5	4.5	5.1	5.4	5.3
7	7.4	5.0	4.9	7.1	7.3	5.2	4.8	4.5	4.5	5.1	5.8	5.3
8	7.5	4.9	4.8	7.0	7.2	5.3	4.9	4.5	4.6	5.1	6.4	5.2
9	7.5	4.9	4.9	6.8	7.3	5.2	4.9	4.5	4.5	5.1	6.8	5.2
10	7.5	4.9	4.8	6.7	7.4	5.0	4.9	4.5	4.6	5.3	7.0	5.2
11	7.3	4.9	4.8	6.7	7.1	5.0	4.9	4.5	4.6	5.3	7.2	5.4
12	7.0	4.8	4.8	6.7	6.9	5.0	4.9	4.5	4.8	5.4	7.3	5.6
13	6.8	4.9	4.9	6.5	6.6	5.0	4.8	4.5	4.8	5.4	7.3	6.3
14	6.5	4.7	4.9	6.4	6.3	5.0	4.8	4.4	4.8	5.5	7.2	6.3
15	6.6	4.7	4.9	6.2	6.3	4.8	4.7	4.4	4.8	5.5	7.0	6.1
16	6.5	4.6	5.0	6.1	6.2	4.9	4.8	4.4	4.8	5.6	6.8	6.1
17	6.4	4.6	5.2	6.1	6.0	4.9	4.7	4.4	4.8	5.6	6.6	5.9
18	6.4	4.6	5.4	6.0	6.0	4.9	4.6	4.4	4.8	5.4	6.4	6.0
19	6.2	4.6	5.5	5.9	5.8	4.8	4.6	4.4	4.8	5.4	6.2	6.1
20	6.2	4.6	5.7	5.8	5.8	4.8	4.6	4.4	4.8	5.3	6.2	5.8
21	6.6	4.7	5.9	5.7	5.6	4.7	4.6	4.4	4.7	5.3	6.2	5.7
22	7.1	4.7	6.1	5.6	5.5	4.7	4.6	4.4	4.7	5.3	6.1	5.8
23	7.5	4.7	6.3	5.5	5.4	4.7	4.5	4.4	4.7	5.2	6.0	5.8
24	7.1	4.6	6.6	5.3	5.3	4.7	4.6	4.4	4.7	5.3	5.8	5.9
25	6.9	4.6	7.1	5.3	5.3	4.8	4.6	4.4	4.7	5.3	5.8	6.2
26	6.9	4.6	7.3	5.3	5.3	4.8	4.5	4.4	4.7	5.2	5.8	6.4
27	6.6	4.6	7.8	5.3	5.3	4.8	4.5	4.4	4.7	5.2	5.7	6.6
28	6.4	4.6	8.1	5.5	5.3	4.8	4.5	4.4	4.7	5.1	5.6	6.9
29	6.2	.....	8.2	5.5	5.2	4.8	4.5	4.4	4.7	5.1	5.5	7.7
30	5.9	.....	8.5	5.6	5.6	4.8	4.5	4.4	4.9	5.1	5.5	7.9
31	5.7	.....	8.5	.....	5.5	.....	4.5	4.4	.....	5.1	.....	8.0
1908.												
1	8.3	5.4	6.1	9.1	6.5	5.6	5.1	5.1	4.7	4.6	4.4	5.0
2	8.3	5.4	6.0	9.2	6.4	5.5	5.1	5.1	4.7	4.5	4.4	4.7
3	8.2	5.4	5.9	8.9	6.2	5.5	5.0	5.1	4.7	4.5	4.4	4.6
4	8.0	5.3	5.9	8.7	7.0	5.5	5.0	5.1	4.7	4.5	4.4	4.6
5	7.7	5.2	5.9	8.4	7.4	5.4	5.1	5.1	4.7	4.5	4.4	4.7
6	7.6	5.2	5.9	8.1	7.4	5.3	5.0	5.1	4.7	4.5	4.4	4.7
7	7.4	5.1	5.9	7.9	7.5	5.3	5.0	5.0	4.7	4.5	4.4	4.6
8	7.1	5.1	5.8	7.6	7.9	5.3	5.1	5.0	4.7	4.5	4.4	4.6
9	6.7	5.0	5.7	7.5	8.1	5.3	4.9	5.0	4.7	4.5	4.4	4.6
10	6.4	5.0	5.7	7.3	8.3	5.2	4.9	5.0	4.7	4.5	4.4	4.6
11	6.4	4.9	5.7	7.6	8.3	5.1	4.9	5.0	4.7	4.6	4.4	4.6
12	6.2	4.9	5.6	7.5	8.4	5.1	4.9	4.9	4.6	4.5	4.4	4.6
13	6.0	4.9	5.6	7.5	8.3	5.0	4.8	5.0	4.6	4.5	4.4	4.6
14	6.0	5.0	5.9	7.4	8.2	5.0	4.8	4.9	4.6	4.5	4.5	4.6
15	5.8	5.2	6.5	7.3	8.2	5.0	4.8	4.9	4.6	4.5	4.4	4.6
16	5.8	5.7	7.2	7.1	8.1	4.9	4.8	4.8	4.6	4.5	4.4	4.6
17	5.8	5.9	8.2	7.0	7.9	5.0	4.8	4.8	4.6	4.4	4.4	4.6
18	5.8	7.1	8.2	7.0	7.5	5.2	4.8	4.8	4.6	4.4	4.4	4.6
19	5.6	7.2	8.4	6.8	7.4	5.4	4.8	4.8	4.5	4.4	4.5	4.6
20	5.5	7.6	8.3	6.8	7.1	5.5	4.9	4.8	4.5	4.4	4.6	4.6
21	5.4	7.5	8.1	6.6	6.8	5.3	4.9	4.8	4.5	4.4	4.6	4.6
22	5.4	7.4	7.8	6.5	6.8	5.2	5.1	4.8	4.5	4.4	4.6	4.6
23	5.4	7.3	7.8	6.3	6.8	5.3	5.2	4.8	4.5	4.4	4.6	4.6
24	5.6	7.2	7.7	6.1	6.7	5.4	5.2	4.7	4.5	4.4	4.6	4.6
25	5.7	7.0	8.0	6.1	6.7	5.2	5.3	4.7	4.5	4.4	4.6	4.6
26	5.6	6.8	7.8	6.5	6.5	5.2	5.4	4.7	4.5	4.4	4.7	4.6
27	5.6	6.6	8.1	6.0	6.4	5.2	5.4	4.7	4.5	4.4	4.8	4.6
28	5.6	6.4	8.3	6.0	6.1	5.2	5.4	4.7	4.5	4.4	4.7	4.6
29	5.5	6.2	8.6	6.3	6.0	5.2	5.4	4.7	4.6	4.4	4.7	4.6
30	5.5	.....	8.8	6.1	5.9	5.2	5.3	4.7	4.6	4.4	4.7	4.6
31	5.5	.....	9.0	.....	5.8	.....	5.2	4.7	.....	4.4	.....	4.6

NOTE.—Owing to swiftness of current this stream is not ordinarily affected by ice conditions at this station except occasionally, due to backwater from ice collecting below.

Rating table for Oswegatchie River near Ogdensburg, N. Y., for 1903 to 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
4.40	590	5.50	2,180	6.60	5,185	7.70	8,450
4.50	680	5.60	2,400	6.70	5,480	7.80	8,750
4.60	780	5.70	2,640	6.80	5,775	7.90	9,050
4.70	890	5.80	2,890	6.90	6,070	8.00	9,350
4.80	1,010	5.90	3,160	7.00	6,365	8.20	9,960
4.90	1,140	6.00	3,440	7.10	6,660	8.40	10,570
5.00	1,280	6.10	3,730	7.20	6,955	8.60	11,180
5.10	1,440	6.20	4,020	7.30	7,250	8.80	11,790
5.20	1,610	6.30	4,310	7.40	7,550	9.00	12,400
5.30	1,790	6.40	4,600	7.50	7,850	9.20	13,020
5.40	1,980	6.50	4,890	7.60	8,150		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 20 discharge measurements made during 1903–1907. Although the discharge measurements plot somewhat erratically, due to poor measuring conditions, the curve can be considered fairly well defined, owing to the tendency for errors of measurement to compensate and the permanency of conditions of flow at this point from year to year.

Monthly discharge of Oswegatchie River near Ogdensburg, N. Y., for 1907 and 1908.

[Drainage area, 1,580 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	7,850	1,790	5,390	3.41	3.93	B.
February	2,400	780	1,140	.722	.75	B.
March	10,900	680	3,380	2.14	2.47	B.
April	10,900	1,790	4,800	3.04	3.39	B.
May	7,550	1,610	3,910	2.47	2.85	B.
June	1,980	890	1,250	.791	.88	B.
July	1,140	680	909	.575	.66	B.
August	680	590	628	.397	.46	B.
September	1,010	590	847	.536	.60	B.
October	2,400	1,010	1,670	1.06	1.22	B.
November	7,250	1,440	3,940	2.49	2.78	B.
December	9,350	1,610	3,550	2.25	2.59	B.
The year	10,900	590	2,620	1.66	22.58	
1908.						
January	10,300	1,980	4,420	2.80	3.23	B.
February	8,150	1,140	3,650	2.31	2.49	B.
March	12,400	2,400	6,560	4.15	4.78	B.
April	13,000	3,440	7,100	4.49	5.01	B.
May	10,600	2,890	6,930	4.39	5.06	B.
June	2,400	1,140	1,710	1.08	1.20	B.
July	1,980	1,010	1,370	.867	1.00	B.
August	1,440	890	1,130	.715	.82	B.
September	890	680	787	.498	.56	B.
October	780	590	643	.407	.47	B.
November	1,010	590	688	.435	.49	B.
December	1,280	780	807	.511	.59	B.
The year	13,000	590	2,980	1.89	25.70	

NOTE.—The river does not freeze over at this point, owing to the swiftness of the current. There may, however, be occasional backwater from ice collecting below the station.

RAQUETTE RIVER DRAINAGE BASIN.

DESCRIPTION.

Raquette River drains a long, narrow basin, extending from northern Hamilton County to St. Lawrence River. Its sources are on an elevated plateau, dotted with mountains, interspersed with lakes and in general timbered, and containing numerous marsh areas, many of which are on the divide, and feed streams flowing into adjacent drainages.

The mean annual precipitation is about 38 inches, ranging from about 42 inches in the headwaters to 32 inches near the St. Lawrence.

Winter conditions are the usual ones occurring in the Adirondack region, and snow and ice prevail for several months.

Raquette River presents remarkable storage possibilities and has been very extensively studied by the state water supply commission of New York. They propose a large reservoir at Tupper Lake to afford an effective storage of about 10,000,000,000 cubic feet. They further estimate that about double this amount will be required to adequately regulate the flow of the river. This additional storage it is planned to obtain by a system of smaller reservoirs, involving the following lakes and ponds: Little Tupper, Forked, Raquette, Blue Mountain, Utowana, Brandreth, Horseshoe, and Long lakes, South and Slim ponds, and Dead Creek.

Raquette River is very important in its power possibilities, and, in the words of the state water supply commission, "presents in many ways one of the most attractive fields for water power and storage studies of any stream in the State."

The following gaging stations have been maintained in this basin:

Raquette River at Raquette Falls, near Coreys, N. Y., 1908.
Raquette River at Piercefield, N. Y., 1908.
Raquette River at South Calton, N. Y., 1904.
Raquette River at Massena Springs, N. Y., 1903–1908.
Bog River at Tupper Lake, N. Y., 1908.

RAQUETTE RIVER AT RAQUETTE FALLS, N. Y.

This station is located near the center of Raquette Falls, about 8 miles by river upstream from the settlement of Axton, which is 12 miles by road from the village of Tupper Lake. It was established August 27, 1908, and is maintained to obtain data regarding the discharge of Raquette River at this point to be used in the development of the storage possibilities of Raquette River drainage under the direction of the state water supply commission of New York.

A good rating curve has not yet been developed for this station, although fair estimates of discharge are given. The gage readings are obtained by a self-recording gage, which is checked by hydrographers and others who periodically visit the station. The zero of the gage is at elevation 1,606.16 above mean tide as based on the levels of the state water supply commission. The datum of the gage has remained the same since the establishment of the station.

Information in regard to this station is contained in the annual reports of the state water supply commission of New York.

Discharge measurements of Raquette River at Raquette Falls, near Coreys, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 31	C. E. Allen	58.0	95.5	1.25	99.2
September 6	do	55.0	93.4	1.21	92.0
September 17	do	50.0	80.7	.90	59.8
September 23	do	49.0	79.0	.85	53.9
October 12	C. R. Adams	40.0	98.1	1.40	15.4

Daily gage height, in feet, of Raquette River at Raquette Falls, near Coreys, N. Y., for 1908.

Day.	Aug.	Sept.	Oct.	Nov.	Day.	Aug.	Sept.	Oct.	Nov.
1		1.25	1.16	1.30	16		0.96	1.32	
2		1.24	1.26	1.18	17		.94	1.31	
3		1.23	1.36	1.19	18		.90	1.29	
4		1.22	1.40	1.25	19		.85	1.26	
5		1.21	1.40		20		.85	1.22	
6		1.19	1.40		21		.85	1.18	
7		1.16	1.40		22		.85	1.13	
8		1.13	1.40		23		.85	1.10	
9		1.10	1.40		24		.84	1.11	
10		1.07	1.40		25		.83	1.12	
11		1.04	1.40		26		.82	1.14	
12		1.02	1.40		27	1.37	.81	1.18	
13		1.00	1.37		28	1.33	.88	1.23	
14		.99	1.35		29	1.29	.96	1.28	
15		.97	1.34		30	1.25	1.06	1.33	
					31	1.25		1.36	

NOTE.—Gage heights September 30 to October 10 and November 3 are based on comparison with gage readings of Bog River at Tupper Lake, N. Y.

Rating table for Raquette River at Raquette Falls, near Coreys, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.80	52.5	1.20	90.0
.90	58.5	1.30	113
1.00	66.0	1.40	150
1.10	75.8		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on five discharge measurements made during 1908 and is fairly well defined between gage heights 0.8 foot and 1.4 feet.

Monthly discharge of Raquette River at Raquette Falls, near Coreys, N. Y., for 1908.

[Drainage area, 418 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 27–31	138	100	114	0.273	0.05	B.
September	100	53.1	69.3	.166	.19	B.
October	150	77.1	117	.280	.32	B.
November 1–4	113	86.9	97.1	.232	.03	B.

RAQUETTE RIVER AT PIERCEFIELD, N. Y.

This station is located at the head of Black Rapids, about one-half mile downstream from the dam of the International Paper Company in the town of Piercefield. It was established August 20, 1908, to obtain data for use in studies of water power and storage problems.

Black Rapids commence about 100 feet below the station. Discharge measurements at ordinary stages are made by means of a boat held in place by a wire cable. At high stages it is proposed to use the highway bridge just above the dam. The vertical staff gage is

located one-third mile upstream from the measuring section and is about 1,000 feet below the International Paper Company's tailrace. Little or no fall occurs between the gage and the measuring section. The datum of the gage has remained the same since the establishment of the station. The bed of the river is rocky and quite rough, but permanent, and a good rating curve has been developed for low stages.

Information in regard to this station is contained in the annual reports of the state water supply commission of New York.

Discharge measurements of Raquette River at Piercefield, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1908.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 21	C. E. Allen	96	521	2.46	627
September 3	do	96	463	1.89	426
September 11	do	87	352	.46	131
September 15	do	87	349	.45	132
November 1	C. R. Adams	86	309	.15	101

Daily gage height, in feet, of Raquette River at Piercefield, N. Y., for 1908.

[Observer, W. B. Graves.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.98	0.05	0.12	1.15	16		0.50	0.08	0.48	1.00
2		1.95	.05	.12	1.20	17		.48	.08	.50	1.25
3		1.92	.05	.12	1.20	18		.48	.08	.50	1.30
4		1.88	.02	.18	1.25	19		.48	.10	.50	1.25
5		1.82	.02	.20	1.20	20	2.50	.45	.10	.50	1.25
						21					
6		1.80	.02	.20	1.20		2.48	.48	.12	.50	1.50
7		1.78	.10	.30	1.80	22	2.42	.48	.12	.50	1.60
8		1.75	.02	.22	2.45	23	2.40	.50	.12	.50	2.30
9		1.50	.02	.35	2.65	24	2.35	.45	.08	.50	2.10
10		1.42	.10	.35	2.35	25	2.30	.45	.10	.50	1.45
11		.82	.10	.40	1.90	26	2.22	.45	.12	.65	1.85
12		.50	.12	.40	1.60	27	2.18	.45	.12	.80	1.60
13		.50	.15	.38	1.30	28	2.12	.45	.12	.90	1.75
14		.55	.08	.40	1.10	29	2.08	.25	.12	.88	3.00
15		.48	.08	.45	1.10	30	2.05	.00	.12	1.08	2.65
						31	2.00		.12		2.65

NOTE.—Flow at this point is not natural, being affected by storage. River partly frozen over November 17 to 26 and December 4 to 31.

Rating table for Raquette River at Piercefield, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.00	90	0.80	176	1.60	344	2.40	604
.10	97	.90	192	1.70	371	2.50	642
.20	106	1.00	210	1.80	400	2.60	682
.30	115	1.10	228	1.90	430	2.70	725
.40	125	1.20	249	2.00	462	2.80	770
.50	136	1.30	270	2.10	497	2.90	818
.60	148	1.40	293	2.20	532	3.00	868
.70	162	1.50	318	2.30	568		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on five discharge measurements made during 1908 and is well defined.

Monthly discharge of Raquette River at Piercefield, N. Y., for 1908.

[Drainage area, 723 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 20–31	642	462	554	0.766	0.34	A.
September	456	90	220	.304	.34	A.
October	101	91	95.9	.133	.15	A.
November	224	98	133	.184	.21	A.
December	868	210	387	.535	.62	A.

NOTE.—Conditions of flow during November 17 to 26 and December 4 to 31 assumed unaffected by ice on the basis of a discharge measurement made January 5, 1909, which agreed well with the open-channel rating.

RAQUETTE RIVER AT MASSENA SPRINGS, N. Y.

This station is located at the highway bridge at Massena Springs, N. Y. It was established September 21, 1903, was temporarily discontinued October 17, 1903, and resumed April 9, 1904. It is maintained to obtain data regarding the total flow of the river.

The nearest power development is at Raymondville, about 8 miles above the station. The Sunday flow of this stream is often held back during the low-water season while ponds at mills above are being refilled, and under these conditions the effect may be shown in the stream for several days.

All gage heights during 1906 and thereafter are referred to a datum which is 1 foot below that which was used previously, this change being made to obviate minus gage readings. Conditions for obtaining accurate discharge are good, and a good rating table has been developed. During the winter months the discharge is affected by ice.

Information in regard to this station is contained in the annual reports of the state water supply commission of New York and the state engineer and surveyor, State of New York.

Discharge measurements of Raquette River at Massena Springs, N. Y., in 1907 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
March 8 [a]	C. C. Covert	171	332	4.15	556
1908.					
May 13	D. M. Wood	176	1,640	9.31	8,370
September 8	C. E. Allen	150	271	1.48	368
September 25	do	146	270	1.70	380
October 16	C. R. Adams	141	247	1.33	279

[a] Measurement made under ice conditions. Gage height to top of ice, 4.45 feet; average thickness of ice, 2.59 feet.

Daily gage height, in feet, of Raquette River at Massena Springs, N. Y., for 1907 and 1908.

[Observers, C. A. Waitt and C. M. Lincoln.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.[a]												
1	6.3	5.6	4.0	10.2	6.5	4.8	3.9	2.5	1.8	2.6	3.9	4.3
2	7.1	5.4	4.1	9.4	6.4	4.0	4.1	2.0	2.0	2.7	3.9	7.4
3	6.9	5.4	4.5	8.4	6.1	4.7	3.9	1.6	1.9	2.8	3.9	7.4
4	6.8	5.3	4.4	7.6	6.0	4.3	3.1	1.8	1.9	2.8	3.9	7.5
5	7.1	5.6	4.5	6.6	7.8	4.1	2.7	2.3	2.1	3.0	4.0	7.5
6	7.9	4.9	5.2	5.8	7.8	4.1	3.4	2.4	2.1	1.9	4.0	6.6
7	7.5	4.4	4.9	5.6	7.2	4.2	3.0	2.7	1.9	2.4	5.5	6.4
8	6.9	5.0	4.4	6.5	6.9	4.4	2.4	2.5	1.7	2.6	5.5	5.6
9	6.4	5.1	5.0	6.1	6.7	4.2	3.5	2.1	1.8	3.2	5.5	5.6
10	6.5	5.0	4.0	6.0	6.7	4.4	3.0	2.4	2.1	3.7	5.4	5.4
11	6.2	4.9	4.1	5.7	6.7	4.4	3.1	2.3	1.9	4.1	5.2	5.4
12	6.2	4.9	4.4	6.2	6.2	3.6	3.3	2.0	1.8	4.3	5.0	5.1
13	6.2	4.9	4.5	5.9	6.4	3.4	3.3	2.0	1.8	4.3	5.0	4.9
14	5.6	3.8	4.0	5.5	6.5	3.6	2.6	2.0	1.8	4.4	4.8	5.0
15	6.3	5.0	5.1	5.7	6.5	3.3	3.1	1.8	1.7	4.7	4.8	5.6
16	5.9	4.9	5.2	5.6	6.1	3.0	3.7	1.7	1.7	4.6	4.6	6.5
17	5.6	4.7	4.5	4.7	5.8	3.2	3.4	1.7	1.6	4.4	4.7	7.6
18	5.5	4.5	7.2	4.9	5.9	3.0	3.5	1.8	1.5	4.3	4.9	7.7
19	5.5	4.6	7.0	4.8	5.8	2.7	3.5	2.0	1.5	4.2	4.6	7.7
20	7.6	4.7	6.8	4.7	5.6	2.9	3.2	1.8	1.5	4.2	4.5	7.7
21	9.1	3.9	5.7	3.9	6.5	3.2	2.7	2.1	2.3	4.3	4.5	7.4
22	6.6	4.7	5.5	4.0	6.0	3.3	3.1	2.1	2.5	4.2	4.5	7.4
23	6.4	4.7	8.0	3.8	5.8	2.8	3.5	1.8	2.4	4.0	4.4	7.5
24	6.2	4.1	9.2	3.7	5.6	3.3	3.2	1.6	2.4	4.0	4.2	7.7
25	6.1	3.9	8.0	4.3	5.5	3.5	3.1	1.7	2.3	3.8	4.0	7.7
26	5.8	4.6	8.0	4.7	5.2	3.1	3.3	2.1	2.3	3.8	3.9	7.8
27	5.5	4.7	7.4	4.8	4.9	3.0	3.3	1.9	2.4	3.9	3.9	7.8
28	4.8	4.0	8.7	4.3	5.3	3.4	2.5	2.0	2.4	3.9	4.0	10.1
29	6.0	.....	12.0	4.6	5.4	3.3	2.8	2.0	1.7	3.7	4.0	10.8
30	5.5	.....	11.0	4.4	5.2	2.9	2.9	1.8	2.6	3.7	4.0	10.8
31	5.5	.....	11.4	.....	4.7	.....	2.9	1.6	.....	3.9	.....	8.6
1908.[b]												
1	8.6	5.9	.....	.....	8.0	6.4	3.0	2.1	2.0	1.0	1.3	2.4
2	8.6	5.9	.....	.....	8.6	6.0	2.7	1.5	2.2	1.1	1.4	2.0
3	7.9	5.6	.....	.....	8.6	5.5	2.4	1.7	1.6	1.1	1.4	2.0
4	7.9	5.5	.....	.....	8.6	5.1	2.1	1.8	1.4	1.2	1.0	1.7
5	7.9	5.5	.....	.....	8.7	5.0	2.0	2.0	1.4	1.2	.8	1.5
6	6.9	5.3	.....	8.6	8.9	5.0	4.0	2.0	1.4	1.4	.8	2.0
7	6.9	5.4	.....	7.5	8.9	4.9	3.1	2.0	1.5	1.5	1.0	2.2
8	7.1	5.4	.....	7.5	9.0	4.9	2.5	1.8	1.8	1.5	1.0	2.2
9	7.0	5.2	.....	7.1	9.1	4.5	2.0	1.4	1.9	1.5	1.1	2.5
10	6.4	5.2	.....	6.8	9.1	4.4	2.0	1.9	1.8	1.4	1.1	2.8
11	6.4	5.0	.....	7.6	9.2	4.0	1.6	2.0	1.8	1.2	1.5	2.8
12	6.9	5.0	.....	6.2	9.3	3.9	1.6	1.7	1.8	1.1	1.4	3.1
13	7.0	4.8	.....	7.1	9.3	3.9	2.2	1.7	1.9	1.1	1.4	3.0
14	7.0	5.0	.....	6.9	8.9	4.0	2.0	2.0	1.9	1.3	1.6	2.8
15	6.8	5.0	.....	6.7	8.5	4.6	1.5	2.2	1.4	1.3	1.6	2.8
16	6.8	.....	.....	6.7	8.4	3.9	1.9	1.6	1.3	1.2	1.4	2.7
17	6.8	.....	.....	6.7	8.4	3.0	2.0	2.6	1.3	1.1	1.4	2.2
18	6.9	.....	.....	6.6	8.1	2.9	2.0	2.6	1.2	1.4	1.6	2.4
19	6.9	.....	.....	6.1	8.0	2.9	2.0	2.4	1.0	.9	1.8	2.4
20	6.6	.....	.....	5.9	7.7	2.9	3.1	1.6	.9	1.2	1.8	2.7
21	6.6	.....	.....	5.8	7.5	2.8	3.1	1.6	.7	1.1	1.8	3.0
22	5.4	.....	.....	5.6	7.5	2.8	3.8	1.5	.7	1.1	1.6	3.0
23	5.9	.....	.....	5.6	7.4	2.7	3.5	1.5	.7	1.1	1.7	2.9
24	5.9	.....	.....	5.6	7.2	2.5	3.1	1.9	.7	1.2	2.3	2.7
25	5.9	.....	.....	5.8	6.9	2.5	3.1	2.0	1.5	1.2	2.6	2.6
26	6.0	.....	.....	6.0	6.5	2.3	2.0	2.0	1.5	1.4	2.0	2.6
27	6.0	.....	.....	6.3	6.5	2.3	2.1	1.8	1.4	1.4	2.7	3.0
28	6.1	.....	.....	6.8	6.5	2.7	2.3	1.8	1.1	1.2	2.2	2.9
29	6.0	.....	.....	7.3	6.4	2.9	2.4	1.8	1.1	1.2	1.6	2.9
30	6.0	.....	.....	7.3	6.4	3.0	2.1	1.6	1.0	1.2	2.7	2.9
31	5.9	.....	.....	.....	6.4	.....	2.1	1.8	.....	1.1	.....	2.7

[a] Ice conditions prevailed from January 1 to March 30, and during December, 1907. During the frozen periods 1907 gage heights are to water surface in a hole in the ice, except during the first few days in January.

[b] Discharge probably affected by ice conditions from about January 11 to April 5 and December 6–31, 1908. Gage readings during the winter months, 1908, were taken to water surface.

Rating table for Raquette River at Massena Springs, N. Y., for 1907 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	105	2.00	605	3.30	1,500	5.20	3,200
.80	130	2.10	660	3.40	1,580	5.40	3,400
.90	155	2.20	720	3.50	1,660	5.60	3,600
1.00	185	2.30	780	3.60	1,740	5.80	3,820
1.10	215	2.40	845	3.70	1,825	6.00	4,040
1.20	250	2.50	910	3.80	1,910	6.20	4,260
1.30	285	2.60	980	3.90	1,995	6.40	4,490
1.40	325	2.70	1,050	4.00	2,080	6.60	4,730
1.50	365	2.80	1,120	4.20	2,260	6.80	4,970
1.60	405	2.90	1,195	4.40	2,440	7.00	5,230
1.70	450	3.00	1,270	4.60	2,620	8.00	6,600
1.80	500	3.10	1,345	4.80	2,800	9.00	8,050
1.90	550	3.20	1,420	5.00	3,000	10.00	9,600

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on 23 discharge measurements made during 1903–1908, and is well defined between gage heights 1.0 foot and 10 feet. This rating differs materially from that published in the Fourth Annual Report of the State Water Supply Commission of New York. Revision was made on the basis of new data available since the time of the publication of the earlier table.

Monthly discharge of Raquette River at Massena Springs, N. Y., for 1907 and 1908.

[Drainage area, 1,170 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1907.						
January	.....	.....	3,000	2.56	2.95	D.
February	.....	.....	650	.556	.58	D.
March	.....	.....	2,000	1.71	1.97	D.
April	9,920	1,820	3,790	3.24	3.62	A.
May	6,320	2,710	4,210	3.60	4.15	A.
June	2,800	1,050	1,770	1.51	1.68	A.
July	2,170	845	1,430	1.22	1.41	A.
August	1,050	405	616	.526	.61	A.
September	980	365	606	.518	.58	A.
October	2,710	550	1,850	1.58	1.82	A.
November	3,500	2,000	2,540	2.17	2.42	A.
December	.....	.....	2,000	1.71	1.97	D.
The year	9,920	365	2,040	1.74	23.76	
1908.						
January	7,450	.....	3,000	2.56	2.95	D.
February	.....	.....	2,000	1.71	1.84	D.
March	.....	.....	4,000	3.42	3.94	D.
April	.....	3,600	5,360	4.58	5.11	A.
May	8,500	4,490	6,670	5.70	6.57	A.
June	4,490	780	1,990	1.70	1.90	A.
July	2,080	365	902	.771	.89	A.
August	980	325	545	.466	.54	A.
September	720	105	343	.293	.33	B.
October	365	155	260	.222	.26	B.
November	1,050	130	434	.371	.41	B.
December	845	.....	673	.575	.66	D.
The year	8,500	105	2,180	1.86	25.40	

NOTE.—Discharge January to March and December, 1907, estimated on the basis of the discharge of Oswegatchie River at Ogdensburg, N. Y. The values given for these periods can only be considered as very rough estimates.

Discharge during the frozen periods, 1907–8, based mainly on the discharge of Oswegatchie River at Ogdensburg, where the flow is not affected by ice conditions. Discharge December 6–31, 1908, also based on a field inspection made January 6, 1909.

Discharge January 11–31, 1908, 1,590 second-feet; April 1–5, 1908, 8,000 second-feet; December 6–31, 1908, 692 second-feet.

The values given for these periods can only be considered as very rough estimates.

BOG RIVER NEAR TUPPER LAKE, N. Y.

This station is located above Bog River Falls and is about 300 feet below the forks of Tupper Lake Stream and Bog River, and about 2½ miles above Big Tupper Lake in the town of Piercefield. It was established August 24, 1908, to obtain data for use in water-power and storage investigations.

The bed of the stream is sandy with scattered bowlders, but it is probably permanent, and a good low-water rating curve has been developed. Discharge measurements are made at a wire cable, either by wading or from a boat. The staff gage is located about 2½ miles downstream at the head of Bog River Falls and is within a few rods of Big Tupper Lake.

There is no regular gage reader here, gage readings during 1908 being obtained either by a recording gage or by hydrographers and other engineers who periodically visit the station.

The elevation of the zero of the gage, based on the United States Geological Survey bench mark at Tupper Lake junction, according to the levels of the state water supply commission of New York, is 1,563.76 feet above mean tide.

Information in regard to this station is contained in the annual reports of the state water supply commission of New York.

Discharge measurements of Bog River near Tupper Lake, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 24	Adams and Allen	55.0	113	1.55	97.7
August 29	C. E. Allen	54.0	108	1.50	93.4
September 4	do	54.0	97.3	1.36	63.9
September 16	do	43.0	64.5	.84	14.8
September 20	do	39.0	60.6	.74	12.2
October 7	C. R. Adams	47.0	82.0	1.15	42.8

Daily gage height, in feet, of Bog River near Tupper Lake, N. Y., for 1908.

Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.	Day.	Aug.	Sept.	Oct.
1		1.48	1.11	11		1.00	1.06	21		0.74	0.60
2		1.46	1.11	12		.90	1.15	22		.74	.60
3		1.44	1.18	13		.88	1.09	23		.74	.60
4		1.36	1.12	14		.86	1.03	24	1.55	.74	
5		1.36	1.12	15		.85	.97	25	1.55	.74	
6		1.34	1.10	16		.84	.91	26	1.54	.74	
7		1.32	1.09	17		.80	.85	27	1.54	.74	
8		1.32	1.13	18		.77	.79	28	1.51	.83	
9		1.24	1.11	19		.75	.73	29	1.50	.92	
10		1.11	1.10	20		.74	.67	30	1.51	1.01	
								31	1.50		

NOTE.—Gage heights September 21 to 30, and October 13 to 23 based on comparisons with Raquette River at Raquette Falls and Piercefield.

Rating table for Bog River near Tupper Lake, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.60	7.5	1.20	45.6
.70	10.0	1.30	58.2
.80	14.1	1.40	72.4
.90	19.7	1.50	89.5
1.00	26.7	1.60	109
1.10	35.2		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on six discharge measurements made during 1908, and is well defined between gage heights 0.7 foot and 1.6 feet.

Monthly discharge of Bog River near Tupper Lake, N. Y., for 1908.

[Drainage area, 132 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 24–31	99.0	89.5	94.2	0.714	0.21	A.
September	85.9	11.6	32.1	.243	.27	B.
October 1–23	43.4	7.5	27.1	.205	.18	B.

CHATEAUGAY RIVER DRAINAGE BASIN.

DESCRIPTION.

Chateaugay River rises in northern New York, flows northeastward, and unites with the St. Lawrence about 20 miles north of the international boundary. Its basin affords considerable opportunity for storage, principally in the Upper and Lower Chateaugay lakes, which lie on the north slope of the Adirondacks, and for its size, its total drainage area being only 199 square miles, it is rather an important stream for power, much of which is undeveloped.

The following gaging station has been maintained in this river basin: Chateaugay River at Chateaugay, N. Y., 1908.

CHATEAUGAY RIVER NEAR CHATEAUGAY, N. Y.

This temporary station was located about 1,200 feet upstream from the dam of the Chasm Power Company, which is about 3 miles by road from Chateaugay. It is about 9 miles below Lower Chateaugay Lake, and was established August 18, 1908, to obtain data regarding the low-water flow of Chateaugay River, and was discontinued December 12, 1908.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Chateaugay River near Chateaugay, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 18 [a]	G. M. Brett	57	62.0	1.68	112
August 19 [a]	do	54	50.7	1.48	73.9
September 16 [b]	C. R. Adams	48	64.3	1.63	116
November 8 [a]	do	52	35.9	1.20	37.5

[a] Measurement made by wading. [b] Measurement made from bridge.

Daily gage height, in feet, of Chateaugay River near Chateaugay, N. Y., for 1908.

[Observer, W. E. Thayer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		1.45		1.60	16		1.78	1.65	
2		1.42		1.65	17		1.72	1.65	
3		1.38		1.35	18		1.42	1.65	
4		1.50		1.62	19		1.68	1.62	
5		1.42	1.52	1.50	20		1.65	1.65	
6		1.45	1.55	1.75	21	1.62	1.68	1.55	
7		1.40	1.62	1.75	22	1.45	1.60	1.65	
8		1.25	1.68	1.65	23	1.45	1.58	1.65	
9		1.35	1.55	1.40	24	1.62	1.62	1.65	
10		1.45	1.65	1.60	25	1.45	1.40	1.65	
11		1.30	1.78	1.60	26	1.38	1.72	1.62	
12		1.55	1.65	1.50	27	1.32	1.68	1.58	
13		1.55	1.65		28	1.35	1.72	1.65	
14		1.20	1.62		29	1.48	1.60	1.58	
15		1.60	1.65		30	1.50		1.65	

Rating table for Chateaugay River near Chateaugay, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.20	38	1.60	98
1.30	48	1.70	124
1.40	61	1.80	156
1.50	77		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on four discharge measurements made during 1908 and is well defined.

Monthly discharge of Chateaugay River near Chateaugay, N. Y., for 1908.

[Drainage area, 119 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
September 21–30	103	51	72.7	0.611	0.23	A.
October	150	38	86.8	.729	.84	A.
November	150	77	104	.874	.98	A.
December 1–12	140	54	97.3	.818	.37	A.

NOTE.—Discharge estimated October 30 to November 4.

LAKE CHAMPLAIN DRAINAGE BASIN.

DESCRIPTION.

Lake Champlain occupies a long and narrow valley, extending in a north-south direction and forming a part of the boundary between New York and Vermont. The elevation of the lake is about 95 feet above tide, and the water-surface area is 436 square miles.

The drainage basin is irregular in form, being about 75 miles wide from a point opposite Middlebury, Vt., northward to the outlet of the lake at Rouse Point, on the international boundary. South of Middlebury the average width of the basin is about 35 miles, and the lake itself is very narrow, forming virtually a drowned river.

The tributary region is rugged and mountainous, mostly covered with little depth of soil except in the stream valleys. The drainage is received almost entirely through large tributaries, there being little direct coast drainage into the lake. The outlet of the lake is Richelieu River, which flows northward from Rouse Point to St. Lawrence River. The total drainage area at the mouth of the lake is about 7,900 square miles (including lake surface).

The following gaging stations have been maintained in this river basin:

Lake Champlain at Burlington, Vt., 1907–8.
Richelieu River at Fort Montgomery, N. Y., 1875–1908.
Winooski River at Richmond, Vt., 1903–1907.
Otter Creek at Middlebury, Vt., 1903–1907.
Poultney River at Fairhaven, Vt., 1908.
Mettawee River at Whitehall, N. Y., 1908.
Lake George Outlet at Ticonderoga, N. Y., 1904–5.
Bouquet River at Willsboro, N. Y., 1904 and 1908.
Au Sable River at Keeseville, N. Y., 1904 and 1908.
Saranac River at Saranac Lake, N. Y., 1902–3.
Saranac River at Plattsburg, N. Y., 1903–1908
Big Chazy River at Mooers, N. Y., 1908.

ICE CONDITIONS ON LAKE CHAMPLAIN.

Lake Champlain does not usually close over in its wider portions until the latter part of January. Occasionally the period of closure will not occur until February, and sometimes will last only for a few days.

The date of freezing over at Rouse Point from 1897 to 1908 is as follows:

Year.	Frozen over.	Year.	Frozen over.	Year.	Frozen over.
1897	Dec. 19	1901	Dec. 5	1905	Dec. 5
1898	Dec. 14	1902	Dec. 7	1906	Dec. 3
1899	[a]Dec. 7	1903	Nov. 30	1907	Dec. 5
1900	Dec. 11	1904	Dec. 1	1908	Dec. 6

[a] Lake opened again for short time December 28.

The dates of breaking up of ice on Lake Champlain, 1897 to 1909, are as follows:[a]

Year.	Ice broke up.	Steamers commenced running between Burlington and Plattsburg.	Year.	Ice broke up.	Steamers commenced running between Burlington and Plattsburg.
1897	Apr. 7	Apr. 10	1904	Apr. 18	Apr. 19
1898	Mar. 25	Mar. 26	1905	Apr. 14	Apr. 17
1899	Apr. 19	Apr. 20	1906	do	Do.
1900	Apr. 20	Apr. 21	1907	Apr. 16	Apr. 18
1901	Apr. 15	Apr. 17	1908	Apr. 14	Apr. 20
1902	Apr. 5	Apr. 7	1909	Apr. 13	Apr. 19
1903	Mar. 17	Mar. 25			

CHAMPLAIN CANAL AND GLENS FALLS FEEDER, NEW YORK.

The discharge of Hudson River at both Fort Edward and Mechanicville is diminished somewhat by the water required for operating the Champlain Canal. In the northern portion of this canal—from Northumberland to Lake Champlain, at Whitehall—the summit level (between Fort Edward and Fort Ann) is supplied (1) by the Glens Falls feeder, a branch canal, leaving Hudson River about 2 miles above Glens Falls, and (2) by Wood Creek. At Northumberland the canal crosses the Hudson, and the southern portion receives its principal water supply here.

The quantity of water diverted from Hudson River for the Champlain Canal has been measured occasionally at various points, and a summary of discharges in second-feet follows, of measurements made prior to 1907, these results being compiled principally from the reports of the state engineer of New York:

Glens Falls feeder:	
(1) At guard lock near feeder dam—	
Rafter, October 8, 1895	383
Horton, August 25, 1904	302
(2) At Glens Falls, Chain bridge—	
Rafter, October 8, 1895	364
Horton, September 25, 1905 (11 a. m.)	295
September 25, 1905 (3 p. m.)	292
(3) Glens Falls, just above waste weir—	
Rafter, October 9 and 10, 1895	213
(4) At Glens Falls, ½ mile below site of previous gaging—	
Rafter, October 10, 1895	191
(5) At Sandy Hill, near entrance to Champlain Canal—	
Rafter, October 11, 1895	182
Champlain Canal, north from Sandy Hill to Lake Champlain:	
(6) Just north of Glens Falls feeder entrance—	
Rafter, October 11, 1895	74

[a] Courtesy of Mr. D. A. Loomis, general manager Champlain Transportation Company, Burlington, Vt.

Champlain Canal, south from Sandy Hill to Northumberland:

(7) Notre Dame Street Bridge, Fort Edward—

Weeks, August 29, 1905 78

Weeks, September 25, 1905 138

Champlain Canal, south from Northumberland to Mechanicville:

(8) Between locks 9 and 10—

Kuichling, October 10, 1900 131

Kuichling, October 11, 1900 139

(9) Mechanicville, Saratoga Street Bridge—

Weeks, August 29, 1905 84

During 1907 additional measurements of flow were made by the hydrographers of the geological survey for the New York state water supply commission, the results following:

Measurements of flow in Champlain Canal, etc., October 9–12, 1907.

No.	Locality.	Date.	Discharge.	Mean velocity.	Remarks.
	Below Northumberland.				
			Sec.-ft.	*Ft. per sec.*	
1	Champlain Canal at Mechanicville	Oct. 9	90.1	0.36	
2	Spillway near Mechanicville	...do...	7	.....	Estimated.
3	Spillway at Bemis	...do...	13.1	1.27	
4	Spillway at Stillwater	...do...	11.3	.71	
5	Schuyler Creek opposite No. 4	...do...	10–15	.....	Do.
6	Champlain Canal at Stillwater	...do...	101	.53	
7	Champlain Canal below Coveville	...do...	131	.46	
8	Spillway near Coveville	...do...	5–8	.....	Do.
9	.....do	...do...	1	.....	Do.
10	.....do	...do...	4 or 5	.....	Do.
11	Champlain Canal at Coveville	...do...	89.5	.34	
12	Champlain Canal at Schuylerville	Oct. 10	16.2	.05	Do.
13	Lock at head of Champlain Canal, Northumberland	...do...	4–6	.....	Do.
	Above Northumberland.				
14	Lock at end of Champlain Canal, Northumberland	Oct. 10	3–5	.....	
15	Champlain Canal at Fort Edward	...do...	.....	.....	
16	Glens Falls feeder at Sandy Hill	Oct. 11	159	.67	
17	Champlain Canal at Sandy Hill	...do...	90.1	.25	
18	Spillway between Fort Edward and No. 16	...do...	1	.....	Estimated.
19	Glens Falls feeder at Glens Falls	Oct. 12	176	.67	
20	.....do	...do...	213	.78	

1. Made from Saratoga Street Bridge.
2. This spillway is about 250 yards above mill of West Virginia Pulp Company at Mechanicville; is 90 feet across; water flowing over about 1 inch in depth.
5. Schuyler Creek flows into the canal opposite the Stillwater spillway; no measurement of this could be made, but estimated flow was 10 or 15 second-feet.
6. Measurement from bridge at Stillwater.
7. Measurement from Bridge No. 45, opposite W. F. Curtis.
8. Spillway between bridges Nos. 46 and 47; not sufficient flow for measurement; estimated at 5 to 8 second-feet.
9. Spillway just above Bridge No. 51; estimated flow at 1 second-foot.
10. Small spillway 75 yards below Coveville; estimated flow, 4 or 5 second-feet.
11. Measurement from footbridge behind Coveville post-office.
12. Measurement from Bridge No. 63; soundings made, but only a trace of velocity; estimated at 0.05 foot per second. There are three spillways just below this bridge. At No. 62, 250 yards below here, there is absolutely no velocity.
13. Lock not in use at this time; 4 to 6 second-feet estimated leakage.
14. Lock at end of canal; estimated leakage, 3 to 5 second-feet.
15. At East Street Bridge, Fort Edward, current while soundings were being made, but ceased before measurement; about 5 second-feet leakage through lock here.
16. From Change Bridge west of trolley line at Sandy Hill.
17. From bridge 45 feet north of entrance of Glens Falls feeder; current runs north.
18. There is but one bridge between Fort Edward and Glens Falls feeder, about 150 yards above Fort Edward lock; barely a trace of current here in canal; estimated flow over lock gates of 10 or 12 second-feet. Between Fort Edward and Glens Falls feeder is one small waste weir; estimated flow over this, 1 second-foot.
19. At plate girder highway bridge at Glens Falls.
20. At Change Bridge near feeder dam, Glens Falls.

Measurements of flow in Champlain Canal, etc., October 29–30, and November 23, 1907.

No.	Locality.	Date.	Discharge.	Mean velocity.
			Sec.-ft.	*Ft. per sec.*
1	Champlain Canal at Mechanicville	Oct. 29	130	0.52
17	Champlain Canal at Sandy Hill	...do....	125	.32
16	Glens Falls feeder at Sandy Hill	...do....	177	.88
15	Champlain Canal at Fort Edward	...do....	129	.51
19	Glens Falls feeder at Glens Falls	Oct. 30	203	.81
20	....do	...do....	232	.88
1	Champlain Canal at Mechanicville	Nov. 23	108	.44
15	Champlain Canal at Fort Edward	...do....	140	.55
16	Glens Falls feeder at Sandy Hill	...do....	176	.73

Gagings were made by the state engineer's assistants, as follows:

Current-meter discharge measurement of Glens Falls feeder.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
	At first bridge below dam above Glens Falls.				
1907.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
November 26	E. F. Weeks	42.5	238	8.8	223
Do	....do	42.5	233	8.72	193
	At Ferry Street Bridge, Sandy Hill.				
November 26	E. F. Weeks	47.5	232	6.38	226
Do	....do	47.5	231	6.4	200

From the foregoing data the following conclusions have been drawn as to conditions during 1907:

Apparently about 220 second-feet [a] enters the Glens Falls feeder from the Hudson River. About 60 second-feet returns to the river before reaching Fort Edward, leaving 160 second-feet which enters the Champlain Canal, and which should be added to the recorded flow of the Hudson River at Fort Edward. Of this amount, about 90 second-feet flows north toward Lake Champlain and is permanently diverted from the Hudson drainage; the remaining 70 second-feet flows south and probably nearly all gets back into the Hudson at or before the Northumberland crossing.

The supply of water taken for the southern part of the canal, below Northumberland is probably about 90 second-feet, which, with the 90 second-feet flowing north into Lake Champlain, makes a total of about 180 second-feet to be added to the recorded flow at Mechanicville.

[a] This is considerably less than found by Rafter in 1895, and is occasioned by the better condition of the canal and the smaller amount of leakage in the vicinity of Glens Falls.

It will be noted that the gagings have nearly all been made late in the season, when perhaps the use of the water was not at a maximum.

In view of this fact the following values are assumed as applicable during the portion of the season that the canal is in operation (from about May to November inclusive): At Fort Edward add 180 second-feet to the recorded flow; at Mechanicville add 200 second-feet to the recorded flow.

LAKE CHAMPLAIN AT BURLINGTON, VT.

This station is located on the south side of the roadway leading to the docks of the Champlain Transportation Company, of Burlington, Vt., at a point about 80 feet from the roadway at the foot of King street, and readings have been obtained since May, 1, 1907.

During 1907 and 1908 gage readings were taken for comparison with those at Rouse Point. This work was done under the direction of Prof. A. D. Butterfield, of the University of Vermont, for the special purpose of transferring mean sea datum from Rouse Point to Burlington and checking the datum at the latter point as used by the topographic branch of the United States Geological Survey. These gage readings were taken and furnished through the courtesy of Mr. D. A. Loomis, general manager of the Champlain Transportation Company.

A comparison of gage readings made upon calm days during 1907 and 1908 indicates that the zero of the gage at Fort Montgomery and at Burlington are at substantially the same elevation, namely, 92.50 feet above mean sea level.

Daily gage height, in feet, of Lake Champlain at Burlington, Vt., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1					5.5	4.16		2.15	1.00	1.30	2.65	
2					5.63					1.40	2.60	2.90
3						4.0		2.10	1.00			2.80
4					5.7	3.93	2.9			1.47	2.80	2.75
5						3.8	2.9	2.10	1.25	1.47		2.90
6					5.95		2.85	2.05	1.30		2.95	2.80
7					5.95	3.71		2.00	1.40	1.50	3.10	2.75
8					5.95	3.65	2.82	2.00			3.30	
9					5.92		2.8	1.90	1.44		3.50	2.85
10						3.52			1.44	1.90		2.80
11					5.85	3.5	2.8		1.42	1.90	3.60	3.25
12						3.42	2.76	1.80		2.00	3.65	3.70
13					5.62	3.32	2.7	1.75	1.50		3.60	
14					5.62	3.2		1.75	1.60	2.17	3.64	
15					5.45	3.2	2.65	1.75		2.18	3.55	
16					5.38		2.6	1.65	1.60	2.20	3.50	
17					5.37		2.55	1.55	1.50	2.20	3.35	
18					5.3	3.0	2.55		1.50	2.20	3.40	
19							2.5	1.50	1.50		3.40	
20					5.1		2.45	1.45	1.50		3.20	3.75
21								1.40	1.40		3.20	
22					5.0	2.9	2.45	1.40			3.20	3.70
23					4.9		2.4	1.35	1.35	2.10	3.20	3.70
24					4.82	2.85	2.4	1.30	1.30	2.08		
25					4.72		2.35		1.35	2.00	3.18	
26							2.35	1.25	1.30	2.00	3.15	
27					4.5		2.3	1.20	1.30		3.15	
28						2.85		1.20	1.29		3.13	4.00
29					4.4	2.9	2.25	1.15		2.20	3.10	
30					4.3	2.9	2.2	1.10	1.30	2.50	3.05	4.25
31					4.23		2.18	1.10		2.65		4.40
1908.												
1				[a] 5.95	6.0	5.1	2.95	1.7	0.98			
2	4.5		[b] 4.45	5.85	6.15	5.1	2.9		.98	0.25		
3	4.5			5.95		5.0	2.8	1.65	.98			−.10
4	4.5			5.95	6.35	4.9		1.6	.98			−.25
5	4.3				6.3	4.85		1.5				−.18
6	4.3			5.8	6.3	4.75	2.6	1.5				
7	4.3			5.78	6.3		2.6	1.5				
8	4.3			5.8	6.3	4.5	2.55	1.4				
9	4.3				6.4	4.45	2.5			.12		
10	4.3			5.85		4.35		1.4				
11	4.3			5.9	6.45	4.3	2.3	1.4			−.18	
12			[a] 4.2			4.3		1.35		.12		
13	4.3			6.0	6.5	4.05	2.2	1.3				
14	4.2	[a] 3.5	[a] 3.75	6.0			2.2	1.25		.05		
15	4.15			6.0	6.45	4.0	2.1	1.2		.05		
16	4.1	([c])		5.9		3.9	2.0					
17	4.1	4.22		5.8		3.9	2.0	1.2			−.18	
18	4.05	4.4		5.8		3.9	2.0	1.2				−.05
19			[a] 4.5			3.9	2.0	1.2				
20	3.95			5.7		3.85	2.0	1.2		.075	−.18	
21			4.45	5.7	6.0		2.0	1.2				
22	4.0	4.55		5.7		3.6	1.95	1.2				
23	3.95		[a] 4.4			3.55	1.9				−.21	
24			[a] 4.4			3.5	1.9	1.1				
25			[a] 4.6	5.45	5.65	3.4	1.9	1.1				
26			[a] 4.6			3.3		1.05				
27		[a] 4.5	[a] 4.8	5.6	5.5	3.25	1.85	1.0				
28			[a] 5.02	5.7	5.4		1.8	.99	.27		−.15	
29				5.9	5.3		1.8	.99				−.08
30			[a] 5.75	6.0		3.0	1.8	.98				
31			[a] 5.85				1.75	.98				

[a] No ice. [b] Top of ice. [c] Heavy rain, snow gone, ice out of Winooski River.

NOTE.—The lake was frozen at the gage the greater part of the time, January 24 to March 31, 1908.

RICHELIEU RIVER AT FORT MONTGOMERY, N. Y.

This station is located in the fort, about one-half mile from the head of Richelieu River, at the outlet of Lake Champlain at Rouse Point, N. Y., where a record of gage heights has been kept by the United States Corps of Engineers since 1875. Through the courtesy of Maj. Edward Burr, the daily gage readings are reported weekly to the United States Geological Survey.

The entire surface of Lake Champlain freezes over nearly every winter, and this may affect the discharge.

The elevation of gage zero at Fort Montgomery is 92.50 feet above mean sea level, according to the adjustment in 1906 of mean sea datum in this vicinity by the topographic branch of the United States Geological Survey. High water level is at elevation 101.6, and on November 13, 1908, an elevation of 91.9 feet was recorded at Fort Montgomery, probably the lowest on record.

The daily discharge of the lake has been determined from observations of the depth and discharge over the Chambly dam, 35 miles below the head of Richelieu River, made in 1898 by the United States Board on Deep Waterways. A rating table has been derived from the observations at the Chambly dam and the gage readings taken at Rouse Point. The area tributary to the river between Rouse Point and Chambly is 310 square miles, making the total drainage basin above Chambly 8,210 square miles.

Monthly discharge is being withheld pending the verification of the rating curve previously used to determine the discharge at this point.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Daily gage height, in feet, of Richelieu River at Fort Montgomery, N. Y., for 1907 and 1908.

[Observer, William McComb.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	1.6	2.55	2.05	4.4	5.45	4.2	2.9	2.2	1.1	1.4	2.6	3.0
2	1.6	2.65	2.15	4.8	5.65	4.1	2.95	2.3	1.2	1.45	2.95	2.85
3	1.65	2.6	2.1	4.9	6.05	4.05	2.9	1.7	1.1	1.55	2.8	2.8
4	1.85	2.55	2.0	5.0	5.95	4.15	2.95	1.6	1.25	1.5	2.65	2.85
5	2.15	2.5	1.95	4.85	5.9	4.2	2.95	1.6	1.25	1.55	2.9	2.8
6	2.35	2.4	1.9	4.9	5.8	3.9	2.9	1.6	1.35	1.5	3.0	2.75
7	2.45	2.5	1.85	5.0	5.92	3.75	2.95	2.05	1.45	1.65	2.95	2.75
8	2.5	2.55	1.85	5.2	5.93	3.66	2.9	1.95	1.4	1.9	3.15	2.7
9	2.4	2.6	1.8	4.9	5.95	3.6	2.8	2.0	1.4	1.8	3.3	2.7
10	2.55	2.65	1.75	4.7	5.85	3.55	2.75	2.0	1.5	2.2	3.4	2.75
11	2.5	2.5	1.8	4.8	5.7	3.5	2.7	1.95	1.6	2.2	3.45	3.0
12	2.48	2.45	1.95	4.8	5.65	3.45	2.7	1.95	1.55	2.1	3.5	3.2
13	2.45	2.6	1.9	4.8	5.7	3.55	2.65	1.85	1.5	2.15	3.65	3.5
14	2.5	2.58	1.85	4.7	5.5	3.4	2.65	1.7	1.6	2.15	3.5	3.55
15	2.5	2.3	1.9	4.75	6.0	3.25	2.7	1.75	1.6	2.25	3.55	3.6
16	2.55	2.3	1.8	4.8	5.5	3.23	2.8	1.85	2.05	2.3	3.5	3.65
17	2.55	2.3	1.75	4.75	5.4	3.15	2.7	1.9	1.45	2.3	3.45	3.6
18	2.6	2.2	1.85	4.7	5.3	3.1	2.6	1.6	1.5	2.0	3.55	3.7
19	2.65	.....	1.95	4.7	5.25	3.02	2.55	1.6	1.7	2.2	3.4	3.75
20	2.65	2.15	1.95	4.6	5.2	3.0	2.55	1.7	1.6	2.1	3.35	3.8
21	2.6	2.2	2.0	4.55	5.2	2.98	2.4	1.45	1.5	2.1	4.0	3.6
22	2.7	2.18	2.05	4.5	4.95	3.0	2.4	1.4	1.4	2.4	3.3	3.7
23	2.65	2.18	2.15	4.45	4.95	3.0	2.4	1.45	1.6	2.0	3.2	3.65
24	2.6	2.25	2.4	4.4	4.8	2.9	2.45	1.85	1.5	2.0	3.1	3.8
25	2.7	2.2	2.65	4.55	4.75	2.92	2.35	1.4	1.4	2.1	3.0	3.9
26	2.7	2.25	2.85	4.7	4.9	2.95	2.4	1.3	1.3	1.9	3.15	4.0
27	2.7	2.2	2.9	4.9	4.6	2.9	2.2	1.25	1.3	2.5	3.1	4.9
28	2.75	2.15	3.25	5.3	4.55	2.9	2.25	1.2	1.25	1.95	3.05	4.4
29	2.78	.....	3.55	5.70	4.33	2.9	2.3	1.15	1.2	2.1	3.0	4.3
30	2.7	.....	4.05	5.2	4.3	2.95	2.25	1.2	1.3	2.2	2.95	4.8
31	2.75	.....	4.45	.....	4.3	.....	2.25	1.1	.....	2.4	.....	4.45
1908.												
1	4.45	3.9	4.2	5.8	6.2	5.1	3.05	1.7	.9	.4	− .3	− .05
2	4.4	3.75	4.2	5.85	6.15	5.05	2.9	1.7	.9	.3	− .25	− .2
3	4.4	3.7	4.1	5.8	6.1	5.05	2.9	1.65	.8	.2	− .25	− .3
4	4.6	3.6	4.05	5.8	6.25	4.9	2.85	1.65	.9	.2	− .2	.0
5	4.4	3.6	4.0	5.85	6.25	4.85	2.7	1.75	1.05	.25	− .3	− .4
6	4.5	3.7	4.05	5.8	6.3	4.8	2.8	1.5	1.1	.25	− .35	− .4
7	4.45	3.55	3.9	5.75	6.5	4.75	2.6	1.5	.75	.4	− .3	− .2
8	4.4	3.5	4.0	5.8	6.4	4.6	2.6	1.45	.7	.25	− .15	− .35
9	4.3	3.5	3.8	5.75	6.4	4.55	2.55	1.45	.85	.0	− .2	− .4
10	4.2	3.5	3.8	5.95	6.3	4.45	2.45	1.5	.7	.05	− .45	− .3
11	4.2	3.45	3.85	5.85	6.4	4.4	2.6	1.5	.7	.2	− .3	− .05
12	4.2	3.4	3.7	5.8	6.35	4.3	2.4	1.5	.6	.15	− .55	− .2
13	4.15	3.5	3.8	5.9	6.3	4.15	2.3	1.4	.55	.3	− .6	− .1
14	4.0	3.4	3.9	5.9	6.35	4.1	2.25	1.4	.50	.3	− .45	− .2
15	4.1	3.55	4.05	5.9	6.35	4.0	2.2	1.25	.45	.2	− .45	− .15
16	4.15	3.75	4.05	5.8	6.4	3.9	1.95	1.3	.45	.15	− .4	− .2
17	4.1	3.95	4.2	5.8	6.2	3.9	2.1	1.6	.5	.15	− .4	− .25
18	4.05	4.1	4.25	5.8	6.25	3.95	2.0	1.25	.5	.1	− .4	− .25
19	4.0	4.25	4.25	5.75	6.3	4.0	1.9	1.4	.3	.1	− .2	− .1
20	4.1	4.35	4.35	5.85	6.1	3.9	1.95	1.15	.4	.1	− .4	− .15
21	3.95	4.45	4.4	5.7	6.0	3.7	2.05	1.2	.65	.1	− .2	− .2
22	4.0	4.4	4.35	5.65	5.95	3.6	2.0	1.3	.45	.1	− .2	− .25
23	3.95	4.4	4.4	5.6	6.0	3.6	1.95	1.1	.3	.05	− .15	− .25
24	3.9	4.4	4.5	5.5	5.75	3.6	1.9	1.1	.45	.05	− .2	− .2
25	3.95	4.45	4.55	5.7	5.6	3.4	1.9	1.05	.4	.....	− .25	− .2
26	3.85	4.4	4.8	5.6	5.65	3.35	1.9	1.0	.45	.....	+ .2	− .3
27	3.8	4.35	4.75	5.6	5.5	3.3	1.9	.95	.45	.....	− .2	− .15
28	3.8	4.3	5.1	5.75	5.45	3.2	1.8	.9	.5	.....	− .3	− .25
29	3.8	4.25	5.35	5.9	5.4	3.3	1.85	1.0	.35	.....	− .2	− .2
30	3.7	.....	5.6	6.0	5.3	3.1	1.8	.9	.4	.....	− .1	.....
31	3.9	.....	5.8	.....	5.2	.....	1.75	.9	.....	.....	.....	− .25

NOTE.—Gage heights recorded October 25 to 31, 1908, are omitted. They were probably incorrect owing to water not having free access to the gage. After October 31 readings were made to a reference point outside the fort and reduced to gage datum.

WINOOSKI RIVER AT RICHMOND, VT.

The headwaters of Winooski River lie in the Green Mountain district in the east-central part of Vermont; whence the stream flows in a general northwesterly direction into Lake Champlain near Burlington. The total area drained is 995 square miles. Considerable areas in the upper part of the basin are in forest. The storage, either artificial or natural, is insignificant.

This station is located at the steel highway bridge about one-fourth mile south of the railroad station at Richmond, Vt., and was established June 25, 1903, to obtain general statistical and comparative data regarding the total flow of the river.

The datum of the chain gage has remained the same during the maintenance of the station. During the winter months the river is affected by ice. Conditions for obtaining accurate discharge are fairly good and the results at this station are satisfactory. This station was discontinued May 1, 1907.

Daily gage height, in feet, of Winooski River at Richmond, Vt., for 1907.

[Observer, J. N. Buley.]

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1			5.55	9.2	16				6.3
2		6.2		7.5	17				6.45
3				6.75	18	6.85			6.5
4	8.7			6.9	19				6.4
5	10.35			8.2	20				5.9
6	8.4			7.7	21				5.55
7	7.5			6.8	22		6.5	6.0	5.55
8	7.2	5.7	5.6	6.7	23				6.3
9	7.05			6.35	24				10.6
10	6.9			6.0	25	6.3			8.8
11	6.8			5.9	26				9.6
12				6.15	27				10.15
13				6.4	28			10.9	9.55
14				6.35	29			11.05	9.2
15		5.8	5.9	6.75	30			12.65	10.2
					31			11.3	

NOTE.—River frozen January 1–5, when the ice broke up at the gage. Also frozen January 10 to March 28, when the ice went out. During the frozen period gage heights were taken to water surface in a hole in the ice. March 28 to 31 may have been affected by ice jam.

Rating table for Winooski River at Richmond, Vt., for 1906 and 1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
4.00	435	5.30	1,615	6.60	3,460	8.80	7,580
4.10	495	5.40	1,735	6.70	3,620	9.00	8,000
4.20	560	5.50	1,860	6.80	3,790	9.20	8,420
4.30	630	5.60	1,985	6.90	3,960	9.40	8,840
4.40	705	5.70	2,115	7.00	4,130	9.60	9,270
4.50	785	5.80	2,250	7.20	4,470	9.80	9,710
4.60	870	5.90	2,390	7.40	4,830	10.00	10,150
4.70	960	6.00	2,530	7.60	5,190	11.00	12,400
4.80	1,060	6.10	2,680	7.80	5,570	12.00	14,700
4.90	1,165	6.20	2,830	8.00	5,950	13.00	17,100
5.00	1,275	6.30	2,980	8.20	6,350		
5.10	1,385	6.40	3,140	8.40	6,750		
5.20	1,500	6.50	3,300	8.60	7,160		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on eight discharge measurements made during 1906 and the form of previous curves. It is well defined between gage heights 3.9 feet and 10 feet.

Monthly discharge of Winooski River at Richmond, Vt., for 1907.

[Drainage area, 885 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March 28-31	16,300	12,200	13,500	15.25	2.27	B.
April	11,500	1,920	4.990	5.64	6.29	B.

NOTE.—See gage-height table footnote.

OTTER CREEK AT MIDDLEBURY, VT.

Otter Creek rises in the northern part of Bennington County, Vt., flows northward, and enters Lake Champlain about 6 miles northwest of Vergennes. It drains a total area of 925 square miles, all in Vermont, and of this 615 square miles are above Middlebury. Large tracts on the headwaters of the river are in forest. The slope of the river between Rutland and Middlebury is very small, but between Middlebury and the mouth it is greater. The slopes of the tributary streams are generally steep. Storage in the basin is insignificant.

This station is located at the railroad bridge, about one-half mile south of the railroad station at Middlebury, Vt., and was established April 1, 1903, to obtain general information of the flow of Otter Creek.

The datum of the chain gage has remained the same during the maintenance of the station. During the winter months the gage heights are somewhat affected by ice. About 800 feet below the station is a dam, largely composed of a natural reef of ledge. This has some effect upon the relation between gage height and discharge at this

station, but as there is nearly always water flowing over the crest of this dam it is believed that the records are not greatly affected. Gagings have been made from the stone arch highway bridge above the dam. This station was discontinued May 1, 1907.

Daily gage height, in feet, of Otter Creek at Middlebury, Vt., for 1907.

[Observer, R. P. Bingham.]

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1		12.4	12.3	15.6	16	13.3			13.9
2				15.6	17				13.8
3	14.5			15.6	18				13.75
4				15.5	19				13.55
5				15.25	20				13.45
6				14.85	21				13.3
7		12.5	12.3	14.4	22		12.35	13.15	13.1
8				13.8	23				13.1
9				13.4	24				14.4
10	14.35			13.2	25	12.5			14.9
11				13.1	26				15.1
12				13.2	27				15.9
13				13.6	28			15.3	15.8
14		12.3		13.85	29			15.45	15.9
15			14.35	13.85	30			15.6	16.15
					31			15.65	

NOTE.—River frozen January 1 to March 28, when the ice went out. During the frozen period gage heights were taken to water surface through a hole in the ice.

Rating table for Otter Creek at Middlebury, Vt., for 1905–1907.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
13.00	945	13.90	1,780	14.80	2,730	15.70	3,720
13.10	1,030	14.00	1,880	14.90	2,840	15.80	3,830
13.20	1,120	14.10	1,980	15.00	2,950	15.90	3,950
13.30	1,210	14.20	2,080	15.10	3,060	16.00	4,070
13.40	1,300	14.30	2,180	15.20	3,170	16.20	4,310
13.50	1,390	14.40	2,290	15.30	3,280	16.40	4,550
13.60	1,480	14.50	2,400	15.40	3,390	16.60	4,790
13.70	1,580	14.60	2,510	15.50	3,500	16.80	5,030
13.80	1,680	14.70	2,620	15.60	3,610	17.00	5,270

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on discharge measurements made during 1905–6 and is well defined between gage heights 13 feet and 18 feet.

Monthly discharge of Otter Creek at Middlebury, Vt., for 1907.

[Drainage area, 615 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
March 28–31	3,660	3,280	3,500	5.69	0.85	B.
April	4,250	1,030	2,320	3.77	4.21	B.

POULTNEY RIVER NEAR FAIR HAVEN, VT.

This temporary station was located at the Delaware and Hudson Railroad bridge about one-half mile above Castleton River and about 2 miles from Fair Haven, Vt. It was established August 26, 1908, and discontinued December 3, 1908, and was maintained to obtain data regarding low-water flow.

This station would probably not be satisfactory at medium and high stages owing to backwater effect from Castleton River.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Poultney River near Fair Haven, Vt., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 26	G. M. Brett	5.3	2.14	0.92	4.70
Do	do	8.0	3.94	.92	5.49
September 20	C. R. Adams	5.3	1.49	.64	1.53

Daily gage height, in feet, of Poultney River near Fair Haven, Vt., for 1908.

[Observer, Frank Brooks.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		0.7	0.7	1.0	0.9	16		0.6	0.9	1.0	
2		.7	0.7	1.0	.95	17		.6	.9	.9	
3		.75	1.0	.9		18		.6	.9	1.0	
4		.85	.7	.9		19		.6	.85	1.0	
5		.8	.7	1.0		20		.6	.8	1.0	
6		.8	.85	1.05		21		.55	.8	1.0	
7		.85	.8	.9		22		.5	.8	1.0	
8		.8	.8	.9		23		.5	.8	.9	
9		.8	.8	.8		24		.5	.8	1.0	
10		.7	.8	.9		25		.5	.75	1.0	
11		.6	.8	.9		26	0.9	.5	.75	.95	
12		.5	.8	.9		27	.9	.5	.8	1.0	
13		.5	.95	.95		28	.8	.5	.8	.9	
14		.6	.9	1.0		29	.75	.6	.9	1.0	
15		.6	.9	1.0		30	.7	.6	1.0	1.0	
						31	.7		1.0		

Rating table for Poultney River near Fair Haven, Vt., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.50	0.6	0.90	4.8
.60	1.2	1.00	7
.70	2.1	1.10	10
.80	3.2		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on three discharge measurements made during 1908 and is fairly well defined.

Monthly discharge of Poultney River near Fair Haven, Vt., for 1908.

[Drainage area 179 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 26–31	4.8	2.1	3.27	0.018	0.004	B.
September	4.0	.6	1.60	.0089	.01	C.
October	7.0	2.1	3.84	.021	.02	B.
November	8.5	3.2	6.12	.034	.04	B.

METTAWEE RIVER NEAR WHITEHALL, N. Y.

This temporary station was located on the farm of Fred Foote, near the second highway bridge above the confluence of Mattawee River and Wood Creek, and about 2 miles from Whitehall. It was established August 25, 1908, to obtain data regarding the low-water flow of Mettawee River, and was discontinued December 5, 1908.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Mettawee River near Whitehall, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of Section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 25	G. M. Brett	22	13.5	1.15	18.8
September 19	C. R. Adams	19	9.6	1.00	10.6

Daily gage height, in feet, of Mettawee River near Whitehall, N. Y., for 1908.

[Observer, B. M. Moore.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1		1.05	1.00	1.20	1.08	16		1.00	1.10	1.08	
2		1.12	1.15	1.12	1.05	17		1.02	1.10	1.12	
3		1.05	1.08	1.18	1.10	18		1.00	1.10	1.10	
4		1.02	1.18	1.05	1.08	19		1.00	1.00	1.12	
5		1.22	1.05	1.15	1.05	20		1.00	1.02	1.12	
6		1.15	1.18	1.15		21		1.00	1.10	1.12	
7		1.02	1.15	1.10		22		.98	1.02	1.10	
8		1.10	1.10	1.08		23		1.00	1.08	1.08	
9		1.00	1.08	1.05		24		1.00	1.08	1.08	
10		1.02	1.05	1.08		25	1.15	1.00	1.05	1.08	
11		1.00	1.15	1.10		26	1.12	1.00	1.02	1.08	
12		1.02	1.05	1.12		27	1.10	1.00	1.05	1.08	
13		1.00	1.20	1.12		28	1.18	1.00	1.10	1.08	
14		1.00	1.18	1.10		29	1.20	1.00	1.20	1.05	
15		1.00	1.10	1.10		30	1.02	1.00	1.25	1.08	
						31	1.00		1.22		

NOTE.—Ice conditions December 5 to 31.

Rating table for Mettawee River near Whitehall, N. Y., for 1908.

Gage height.	Dis-charge.	Gage height.	Dis-height.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.90	7	1.20	23
1.00	11	1.30	33
1.10	16		

NOTE.—The above table is not applicable for ice or obstructed channel conditions. It is based on two discharge measurements made during 1908 and is fairly well defined.

Monthly discharge of Mettawee River near Whitehall, N. Y., for 1908.

[Drainage area, 206 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accu-racy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 25–31	23	11	17.3	0.084	0.02	B.
September	25	10	12.5	.061	.07	B.
October	28	11	16.9	.082	.09	B.
November	23	14	16.4	.080	.09	B.
December 1–5	16	14	14.8	.072	.01	B.

BOUQUET RIVER AT WILLSBORO, N. Y.

This station, which has been maintained to obtain data regarding low-water flow, is located about 1,500 feet below the New York and Pennsylvania Company's mill at Willsboro, N. Y. It was established as a temporary station August 14, 1904, and discontinued September 10, 1904; was reestablished August 24, 1908, and again discontinued November 30, 1908.

About 2 miles below the station the river enters Lake Champlain, which would doubtless cause backwater at high stages of the lake. The main stream comprises two branches, the junction being about 3½ miles above the gaging station.

There is no connection between the datum used in 1904 and that used in 1908. From a comparison of discharge measurements it appears that the zero of the 1904 gage datum was about 0.38 foot above that used in 1908.

The regimen of flow at this station is little affected by the use of water at the New York and Pennsylvania Company's dam, as the one wheel installed runs continuously and additional power is furnished by steam. The discharge estimates are therefore fairly good.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Bouquet River at Willsboro, N. Y., in 1904 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1904.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
July 30	C. C. Covert		113	1.84	188
August 2	do		96	1.42	88
August 4	Covert and Chase		94	1.38	94
August 11	E. D. Chase		88	1.10	77
August 21	Howell and Chase		206	3.00	814
August 26	E. D. Chase		88	1.23	108
September 2	do		77	1.05	71
1908.					
August 24 [a]	G. M. Brett	46	84.9	1.08	74.5
September 21 [a]	C. R. Adams	30	16.3	.49	7.1

[a] Measurements made by wading.

NOTE.—1904 gage heights are reduced to datum of new gage.

Daily gage height, in feet, of Bouquet River at Willsboro, N. Y., for 1908.

[Observer, R. S. P. Mason.]

Day.	Aug.	Sept.	Oct.	Nov.	Day.	Aug.	Sept.	Oct.	Nov.
1		0.95	0.8	0.85	16		0.8	0.85	0.8
2		1.05	.95	.85	17		.85	.8	.85
3		1.0	.95	.75	18		.8	.8	.85
4		1.05	.85	.8	19		.85	.85	.8
5		1.0	.85	.8	20		.8	.8	.75
6		.95	.85	.8	21		.7	.8	.8
7		.95	.9	.8	22		.75	.85	.8
8		.9	.9	.75	23		.75	.8	.8
9		.9	.85	.75	24	1.10	.8	.85	.85
10		1.0	.9	.8	25	.95	.8	.8	.8
11		.95	.85	.8	26	1.0	.8	.85	.8
12		1.0	.9	.85	27	1.0	.75	.8	.8
13		.9	.85	.9	28	1.1	.75	.8	.8
14		.85	.85	.8	29	1.05	.8	.8	.85
15		.85	.85	.8	30	1.1	.8	.85	.8
					31	1.0		.8	

Rating table for Bouquet River at Willsboro, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	23	1.00	60
.80	33	1.10	78
.90	45		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on five discharge measurements made during 1904 and 1908, and is well defined.

Monthly discharge of Bouquet River at Willsboro, N. Y., for 1908.

[Drainage area, 270 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 24–31	78	52	66.9	0.248	0.07	B.
September	69	23	42.5	.157	.18	B.
October	52	33	38.5	.143	.16	B.
November	45	28	34.1	.126	.14	B.

AU SABLE RIVER NEAR KEESEVILLE, N. Y.

This temporary station, which was maintained to obtain data regarding low-water flow of Au Sable River, was located on what is known as the old Hatch farm, owned by C. H. Baldwin, about 3½ miles upstream from Keeseville, N. Y. It was established August 1, 1904, and discontinued September 29, 1904; was reestablished August 21, 1908, and again discontinued September 19, 1908.

Two main branches unite to form Au Sable River at Au Sable Forks, about 20 miles from the mouth of the stream and 12 miles above the gaging station, and are the only tributaries of importance.

The nearest water-power developments are at Clintonville above and Keeseville below the gaging station.

There is no connection between the datum used in 1904 and that used in 1908, but from a comparison of discharge measurements it appears that the zero of the latter is about 0.31 foot above the 1904 datum.

Although but two discharge measurements were made in 1908, by using the data obtained in 1904 it is believed that the results obtained are very good.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Au Sable River near Keeseville, N. Y., in 1904 and 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1904.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 4	Covert and Chase		157	0.91	239
August 17	E. D. Chase		143	.79	193
August 22	do		267	1.83	770
August 29	do		148	.81	198
September 9	Chase and Barrier		155	.90	217
1908.					
August 21	G. M. Brett	99	123	.84	202
September 18	C. R. Adams	110	96	.69	172

NOTE.—1904 gage heights are reduced to datum of new gage.

Daily gage height, in feet, of Au Sable River near Keeseville, N. Y., for 1908.

[Observer, Nellie G. Baldwin.]

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1		0.8	11		0.7	21	0.8	
2		.8	12		.7	22	.8	
3		.7	13		.7	23	.9	
4		.7	14		.7	24	.8	
5			15		.7	25	.8	
6		.8	16		.7	26	.8	
7		.8	17		.7	27		
8		.7	18		.7	28	.8	
9		.7	19			29	.7	
10		.7	20			30	.7	
						31	.7	

Rating table for Au Sable River near Keeseville, N. Y., for 1904 and 1908.

Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
0.70	173	1.30	370	1.90	870	2.50	1,800
.80	194	1.40	420	2.00	1,000	2.60	1,990
.90	220	1.50	480	2.10	1,140	2.70	2,190
1.00	250	1.60	555	2.20	1,290	2.80	2,390
1.10	285	1.70	645	2.30	1,450	2.90	2,600
1.20	325	1.80	750	2.40	1,620		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on seven discharge measurements made during 1904 and 1908, and is well defined between gage heights 0.7 foot and 1.9 feet. The above table is also applicable to 1904 gage heights after a correction of —0.31 foot has been applied to the latter.

Monthly discharge of Au Sable River near Keeseville, N. Y., for 1908.

[Drainage area, 470 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
August 21–31	220	173	191	0.406	0.17	A.
September 1–18	194	173	178	.379	.25	A.

SARANAC RIVER NEAR PLATTSBURG, N. Y.

This station is located at the dam of the Plattsburgh Gas and Electric Company, successor to Plattsburgh Light, Heat and Power Company, commonly called the Lozier dam, about 6 miles above Plattsburg. It was established March 27, 1903, to obtain general statistical data regarding the total flow of Saranac River. (Pl. V, *A*.)

The record includes the flow over a spillway crest 171.75 feet in length, the discharge through two 5-foot waste gates when open, and the discharge through four 33-inch Victor turbines controlled by automatic governors. The records are furnished by Herbert A. Stutchbury, superintendent. Experiments have been made at Cornell University hydraulic laboratory, on a model of the ogee section of the dam, from which coefficients have been derived for the calculation of the discharge.

The datum of the gage has remained the same during the maintenance of the station.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Daily discharge in second-feet of Saranac River near Plattsburg, N. Y., for 1907 and 1908.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907.												
1	418	354	302	2,175	2,058	562	632	337	98	549	362	412
2	687	392	236	1,607	1,797	361	597	403	89	448	177	331
3	627	249	172	1,034	1,541	510	630	190	217	418	281	301
4	613	315	267	790	1,814	536	536	126	311	422	402	401
5	807	360	332	1,009	2,394	513	542	271	561	416	335	477
6	852	389	323	954	1,684	449	497	333	1,061	393	301	470
7	782	374	343	877	1,306	498	871	369	687	340	969	412
8	711	369	407	922	1,402	571	818	383	568	589	939	275
9	622	358	409	607	1,368	370	675	377	509	968	659	556
10	474	199	206	552	1,438	512	475	349	495	707	541	762
11	546	284	337	572	1,170	545	430	143	406	714	454	1,293
12	491	374	421	481	1,650	338	391	192	390	575	358	722
13	322	353	424	626	1,106	330	377	172	419	494	413	589
14	431	351	409	574	1,046	461	311	227	373	655	322	553
15	417	310	396	687	866	444	451	365	256	529	340	541
16	433	349	415	615	793	198	438	193	391	573	371	560
17	361	160	245	1,276	844	306	377	196	348	469	394	580
18	398	291	456	879	857	285	301	87	358	466	409	563
19	387	436	518	829	784	336	320	232	225	466	391	531
20	289	375	451	748	796	316	224	191	222	336	486	515
21	743	382	471	658	816	346	102	224	192	432	460	622
22	668	327	405	721	906	563	237	258	102	428	564	596
23	530	309	1,434	760	725	533	218	237	282	412	543	721
24	421	137	1,507	1,306	857	906	366	234	210	309	546	818
25	404	301	880	1,258	758	762	439	119	301	255	581	953
26	358	283	1,267	1,182	525	774	329	197	403	274	513	892
27	253	309	2,830	1,361	882	552	336	230	383	309	443	752
28	423	314	4,081	1,255	553	643	151	246	309	510	554	847
29	386	.....	3,346	1,527	485	614	372	333	146	567	424	1,232
30	417	.....	3,548	1,578	521	600	393	382	429	488	483	949
31	388	.....	2,274	.....	407	.....	354	274	.....	390	.....	1,106
1908.												
1	941	417	660	2,520	2,010	1,560	275	205	37	160	61	277
2	855	482	533	2,420	1,950	1,280	326	128	64	181	196	245
3	895	443	610	1,970	2,380	1,420	292	82	222	172	234	203
4	787	377	596	1,550	2,830	1,120	100	15	201	140	182	166
5	719	358	628	1,660	2,400	1,050	173	130	216	252	213	123
6	652	430	592	1,940	1,950	864	288	668	89	215	180	77
7	741	360	529	2,510	1,930	975	200	477	256	226	212	262
8	729	397	582	2,310	3,170	1,020	187	312	175	186	166	176
9	620	365	634	2,110	2,160	856	182	208	175	232	222	247
10	449	459	548	1,910	1,860	810	177	255	138	214	214	250
11	523	405	525	2,520	1,720	715	189	247	138	158	243	212
12	669	407	616	2,530	1,600	593	102	178	153	352	252	250
13	693	394	608	2,060	2,360	391	338	265	123	245	270	240
14	634	380	880	1,710	2,230	259	261	256	196	174	219	289
15	472	498	1,230	1,680	1,770	813	218	201	154	208	161	226
16	620	1,190	1,540	1,800	1,480	773	218	147	144	191	250	257
17	593	1,240	1,020	1,720	1,660	682	222	267	147	192	252	272
18	649	1,070	774	1,680	1,900	677	245	358	149	128	208	207
19	587	883	686	1,720	1,990	547	540	314	145	234	259	187
20	547	805	721	1,630	1,800	537	523	313	72	120	212	171
21	623	770	735	1,500	1,780	383	457	228	206	219	262	306
22	701	795	842	1,360	1,690	542	424	228	158	187	143	236
23	643	819	1,030	1,470	1,650	591	235	96	123	155	322	217
24	561	688	1,410	1,500	1,560	622	235	217	144	145	299	172
25	500	722	1,240	1,720	1,560	509	240	95	152	139	369	145
26	547	695	1,230	1,750	1,420	372	223	187	138	253	420	319
27	591	632	2,330	2,310	1,440	355	265	139	84	180	373	157
28	480	687	2,580	2,460	1,420	149	231	145	114	250	352	294
29	483	658	4,630	2,080	1,360	216	235	191	192	205	118	224
30	487	.....	3,460	1,800	1,320	238	224	82	188	230	347	167
31	400	.....	2,580	.....	1,550	.....	232	153	.....	208	.....	197

Monthly discharge of Saranac River near Plattsburg, N. Y., for 1907 and 1908.

[Drainage area, 624 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1907.					
January	852	253	505	0.809	0.93
February	436	137	322	.516	.54
March	4,080	172	939	1.50	1.73
April	2,180	481	981	1.57	1.75
May	2,390	407	1,100	1.76	2.03
June	906	198	491	.787	.88
July	871	102	425	.681	.79
August	403	87	254	.407	.47
September	1,060	89	358	.574	.64
October	968	255	481	.771	.89
November	969	177	467	.748	.83
December	1,290	275	656	1.05	1.21
The year	4,080	87	582	.931	12.69
1908.					
January	941	400	626	1.00	1.15
February	1,240	358	615	.986	1.06
March	4,630	525	1,180	1.89	2.18
April	2,530	1,360	1,930	3.09	3.45
May	3,170	1,320	1,870	3.00	3.46
June	1,560	149	697	1.12	1.25
July	540	100	260	.417	.48
August	668	15	219	.351	.40
September	256	37	150	.240	.27
October	352	120	198	.317	.37
November	420	61	240	.385	.43
December	319	77	218	.350	.40
The year	4,630	15	684	1.10	14.90

BIG CHAZY RIVER NEAR MOOERS, N. Y.

This temporary station was located on the highway bridge at Thorn's Corners, between Mooers Forks and Mooers, about 1½ miles below the junction of the two branches which form Big Chazy River. It was about midway between two dams, each about three-fourths of a mile distant. It was established August 28, 1908, to obtain data regarding the low-water flow of Big Chazy River, and was discontinued December 8, 1908.

Information in regard to this station is contained in the reports of the state engineer and surveyor, State of New York.

Discharge measurements of Big Chazy River near Mooers, N. Y., in 1908.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
August 20[a]	G. M. Brett	26.0	15.0	1.28	27.6
September 17[a]	C. R. Adams	29.0	33.9	1.12	17.0
November 9[b]	do	23.0	65.4	1.37	46.6

[a] Measurement made by wading. [b] Measurement made from the bridge.

Daily gage height, in feet, of Big Chazy River near Mooers, N. Y., for 1908.

[Observer, T. Vaschon.]

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.1	1.2	1.25	1.6	16	.....	1.15	1.2	1.40	.....
2	.....	1.1	1.2	1.25	1.3	17	.....	1.15	1.15	1.35	.....
3	.....	1.1	1.2	1.25	1.15	18	.....	1.15	1.1	1.35	.....
4	.....	1.1	1.35	1.2	1.4	19	.....	1.15	1.1	1.35	.....
5	.....	1.1	1.25	1.25	1.35	20	1.3	1.15	1.2	1.35	.....
6	.....	1.0	1.3	1.55	1.0	21	1.3	1.1	1.1	1.3	.....
7	.....	1.25	1.1	1.25	1.45	22	1.2	1.1	1.1	1.35	.....
8	.....	1.15	1.15	1.15	.....	23	1.2	1.15	1.2	1.3	.....
9	.....	1.15	1.15	1.35	.....	24	1.2	1.15	1.2	1.4	.....
10	.....	1.15	1.2	1.35	.....	25	1.2	1.15	1.1	1.45	.....
11	.....	1.3	1.25	1.5	.....	26	1.15	1.1	1.15	1.5	.....
12	.....	1.1	1.3	1.55	.....	27	1.25	1.1	1.3	1.5	.....
13	.....	1.0	1.2	1.5	.....	28	1.2	1.1	1.15	1.3	.....
14	.....	1.2	1.2	1.45	.....	29	1.15	1.25	1.3	1.4	.....
15	.....	1.05	1.2	1.35	.....	30	1.0	1.25	1.2	1.3	.....
						31	1.25	.....	1.3	.....	.....

Rating table for Big Chazy River near Mooers, N. Y., for 1908.

Gage height.	Discharge.	Gage height.	Discharge.
Feet.	*Sec.-ft.*	*Feet.*	*Sec.-ft.*
1.00	10	1.40	48
1.10	15	1.50	72
1.20	22	1.60	104
1.30	32		

NOTE.—The above table is not applicable for ice or obstructed-channel conditions. It is based on three discharge measurements made during 1908 and is fairly well defined.

Monthly discharge of Big Chazy River near Mooers, N. Y., for 1908.

Month.	Discharge in second-feet.			Accuracy.
	Maximum.	Minimum.	Mean.	
August 20–31	32	10	22.8	B.
September	32	10	17.7	B.
October	40	15	22.5	B.
November	88	18	45.0	B.
December 1–7	104	10	44.6	B.

MISCELLANEOUS MEASUREMENTS IN ST. LAWRENCE RIVER DRAINAGE BASIN.

The following miscellaneous discharge measurements were made in St. Lawrence River drainage basin during 1908:

Miscellaneous measurements in St. Lawrence River basin in 1908.

Date.	Stream.	Locality.	Gage height.	Discharge.
			Feet.	*Sec.-ft.*
July 23	Canaseraga Creek	Near West Sparta, N. Y	[a] 11.10	142
September 8	Grass River	Chase Mills, N. Y	[b] 22.4	194

[a] Reference point is top of downstream end of second floor beam from right end of truss.
[b] Reference point is a small crowfoot at middle of highest part of upstream edge of upstream spandrel.

SUMMARIES OF DISCHARGE PER SQUARE MILE.

The following tables of summaries of discharge per square mile are given to allow of ready comparison of relative rates of run-off from different areas in the St. Lawrence River drainage basin.

They show in a general way the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage. But the most important fact worth noting is the almost entire lack of uniformity or agreement between any two stations. It indicates that the discharge of each stream is a law unto itself, and that all projects dependent upon stream flow, if they are to be developed along the safest and most economical lines, must be based on records of stream flow collected with great care over a long series of years as near the location of the project under consideration as possible.

Summary of discharge, in second-feet per square mile, for river stations in the St. Lawrence River drainage basin in 1907 and 1908.

Station.	Drainage area.	1907.													1908.												
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
	Sq. miles.																										
Escanaba River near Escanaba, Mich.	800	....	....	....	3.02	5.49	1.45	0.66	0.52	0.97	1.04	0.68	....	....	....	....	....	....	3.02	1.38	0.77	0.51	0.28	0.37	0.30	....	....
Menominee River near Iron Mountain, Mich.	2,420	....	....	....	2.39	4.03	1.64	.98	.61	.95	.91	.69	0.54	....	0.46	0.41	0.41	2.36	2.17	1.19	.78	.57	.46	.70	.56	0.63	0.89
Menominee River at Koss, Mich.	3,780	....	....	....	....	....	....	.85	.57	1.12	.76	.64	.62	....	.52	.48	.48	1.87	2.10	1.33	.99	.56	.38	.58	.50	.60	.86
Oconto River near Gillett, Wis.	814	....	....	....	1.43	1.51	1.04	.64	.36	.84	.58	.58	.41	....	.39	.41	.60	1.29	1.78	.71	.90	.32	.35	.43	.45	.34	.66
Wolf River at Keshena, Wis.	797	....	....	....	....	....	1.00	1.02	.87	1.24	.87	.80	.75	....	.64	.50	.76	1.71	1.63	1.14	1.18	.71	.59	.77	.72	.56	.91
Kalamazoo River near Allegan, Mich.	1,470	1.24	0.90	1.20	1.11	1.04	.76	.68	....	.56	.70	.69	.91	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Manistee River near Sherman, Mich.	900	1.27	1.00	1.49	1.61	1.52	1.38	1.06	1.02	1.08	1.14	1.14	1.11	1.24	1.05	1.08	1.37	1.88	1.54	1.20	1.14	.99	.94	.99	1.01	1.05	1.19
Thunder Bay near Alpena, Mich.	1,260	1.05	.66	1.46	1.29	1.34	.90	.42	.36	.37	.35	.50	.53	.77	.45	.55	1.04	2.60	1.63	.76	.58	.18	.14	.41	.52	.56	.78
Au Sable River at Bamfield, Mich.	1,420	....	....	....	1.80	1.61	1.73	.96	.80	.85	.89	.84	.82	....	....	....	....	1.72	1.37	1.17	.92	.81	.75	.79	.81	.89	....
Cass River at Frankenmuth, Mich.	863	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.74	1.62	.16	.13	.10	.05	.04	.06	.09	....
Huron River at Geddes, Mich.	757	1.29	.51	.95	1.13	1.06	.54	.32	.18	.29	.42	.48	.60	.65	.89	1.27	2.72	1.16	.83	.35	.13	.36	.19	.19	.20	.31	.72
Huron River at Flat Rock, Mich.	1,000	1.49	.70	1.29	.90	.91	.61	.36	.25	.31	.48	.52	.69	.71	1.03	1.49	2.86	1.34	1.00	.55	.23	.31	.21	.23	.26	.34	.82
Genesee River at St. Helena, N. Y.	1,030	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.11	.11	.16	.16	....
Genesee River at Mount Morris, N. Y.	1,070	2.59	.65	2.79	1.99	1.31	1.07	.86	.20	.22	.60	.79	2.21	1.27	1.04	2.29	4.22	1.95	2.76	1.20	.96	.32	.16	.15	.20	.22	1.29
Genesee River at Jones Bridge near Mount Morris, N. Y.	1,410	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.12	.11	.15	.16	....
Genesee River at Rochester, N. Y.	2,360	2.69	.64	2.29	1.78	1.22	.78	.60	.17	.16	.43	.65	2.09	1.12	1.61	2.52	3.85	1.69	2.55	1.03	.75	.31	.12	.11	.15	.16	1.24
Canadice Lake Outlet at Hemlock, N. Y.	12.6	2.19	1.04	1.37	1.70	.89	.61	.61	.47	.35	.27	.49	1.35	.94	2.10	1.84	2.67	1.31	2.54	.81	.89	.68	.34	.23	.32	.29	1.17
Seneca River at Baldwinsville, N. Y.	3,100	1.80	1.12	1.41	1.47	1.49	1.05	.78	.49	.47	.72	1.08	1.25	1.09	1.35	1.28	1.92	1.66	1.76	1.16	.80	.54	.41	.54	.53	.51	1.04
Skaneateles Lake Outlet at Willow Glen, N. Y.	74.2	.94	.80	.83	.46	.60	.70	.82	.78	.96	1.00	1.01	1.00	.82	1.01	1.01	1.40	1.66	2.04	1.51	1.46	1.50	1.37	1.37	1.36	.96	1.39
Oneida River near Euclid, N. Y.	1,400	4.27	1.81	2.10	2.87	....	....	.87	.66	.44	.62	1.56	1.69	....	2.95	3.30	4.01	....	3.79	1.91	1.21	.87	.52	.64	.88	.74	....
Salmon River near Pulaski, N. Y.	259	4.48	....	....	4.02	3.45	2.46	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.47	.59	1.96	....	....
Black River near Felts Mills, N. Y.	1,850	....	....	....	3.39	2.95	1.05	.74	.42	.89	1.88	2.58	2.82	....	....	....	3.39	4.76	3.73	1.22	.79	.54	.41	.60	.80	.80	....
Moose River at Moose River, N. Y.	346	2.86	.79	2.18	4.13	4.19	1.66	1.17	.68	1.52	2.85	3.09	3.58	2.39	2.46	2.41	4.34	8.64	5.92	1.44	.93	.88	.84	.78	.95	.88	2.54
Oswegatchie River near Ogdensburg, N. Y.	1,580	3.41	.72	2.14	3.04	2.47	.79	.58	.40	.54	1.06	2.49	2.25	1.66	2.80	2.31	4.15	4.49	4.39	1.08	.87	.72	.50	.41	.44	.51	1.89
Racquette River at Piercefield, N. Y.	723	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	.30	.13	.18	.54	....
Raquette River at Massena Springs, N. Y.	1,170	2.56	.56	1.71	3.24	3.60	1.51	1.22	.53	.52	1.58	2.17	1.71	1.74	2.56	1.71	3.42	4.58	5.70	1.70	.77	.47	.29	.22	.37	.58	1.86
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Saranac River near Plattsburg, N. Y.	624	.81	.52	1.50	1.57	1.76	.79	.68	.41	.57	.77	.75	1.05	.93	1.00	.99	1.89	3.09	3.00	1.12	.42	.35	.24	.32	.38	.35	1.10

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